1956 METALWORKING YEARBOOK and PLANNING GUIDE

JANUARY 2, 1956

STEEL
The Metalworking Weekly

A PENTON PUBLICATION

Expansioneering

How To Plan Your Growth —page 101

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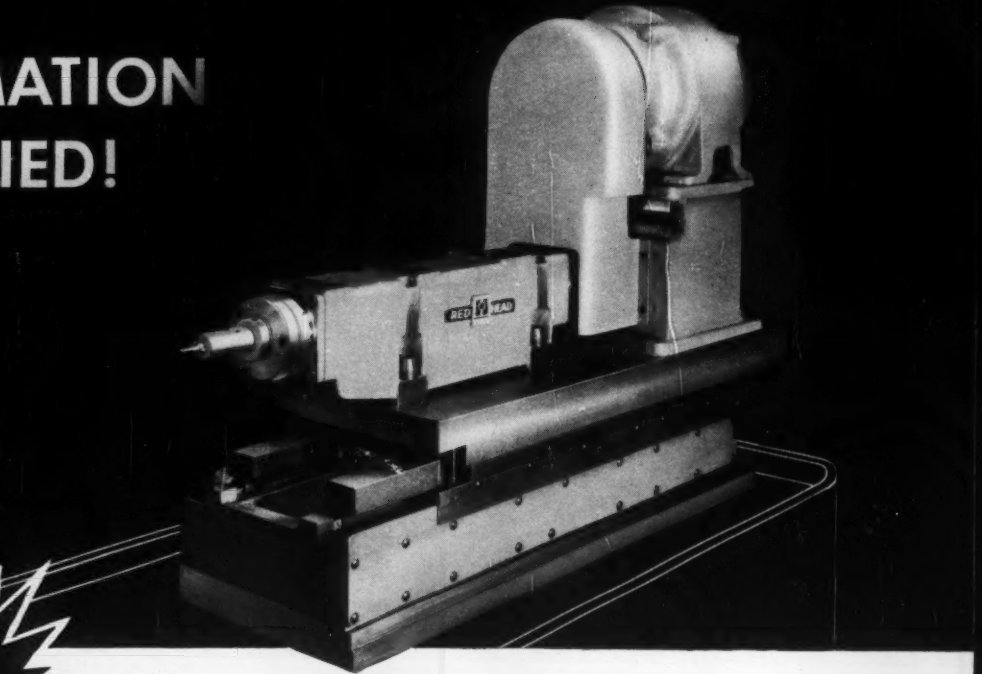
AUTOMATION
SIMPLIFIED!



new

HEALD SLIDE-UNIT BORE-MATICS

permit important cost savings
and give new flexibility on
fully automated production lines

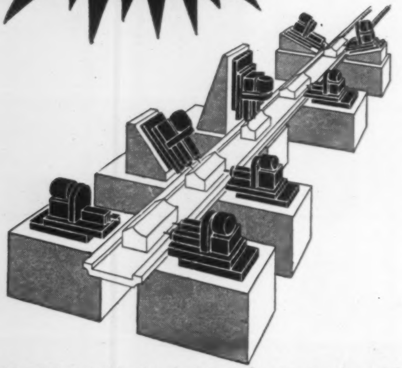
THESE simple, compact, hydraulically operated Heald Slide Units — each complete with boringhead and drive — are ideally suited to a wide variety of automated production lines. They can be mounted in any position from vertical to horizontal and can approach the work from any angle. This simplifies the design and operation of automatic workhandling, clamping and locating equipment — permits each work station to be arranged for the most efficient and economical operation.

In an automated line, each Slide-Unit Bore-Matic is a separate and completely self-contained machine, arranged through interlocking control circuits to function as a fully automatic segment of the entire production line. Hence individual machines can be added as required, permitting full automation to be achieved on an economical basis of planned expansion.

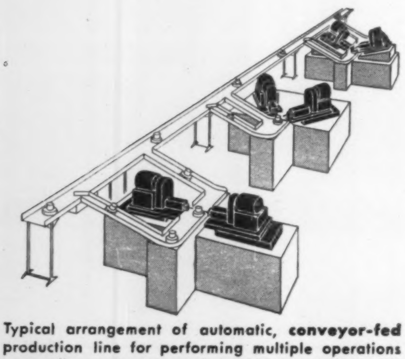
This new precision finishing development is another good reason why IT PAYS TO COME TO HEALD. ®

HEALD

THE HEALD MACHINE COMPANY
Subsidiary of The Cincinnati Milling Machine Co.
Worcester 6, Massachusetts
Chicago • Cleveland • Dayton • Detroit • Indianapolis • New York



Simplified sketch of typical **transfer-type** automated production line for performing multiple operations on relatively large work. Setup includes horizontal, vertical and angular mounting of individual Slide-Unit machines—each a completely self-contained unit.

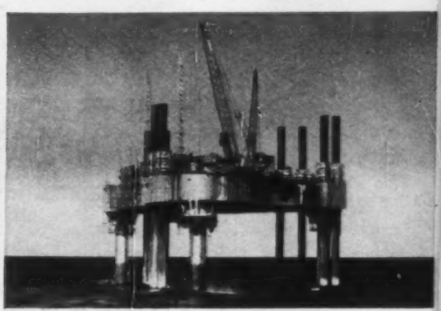


Typical arrangement of automatic, **conveyor-fed** production line for performing multiple operations on smaller work. Any number of identical Slide-Unit machines can be provided in each work station, to give the required overall production rate.

Some 1955 Highlights of Bethlehem Steel

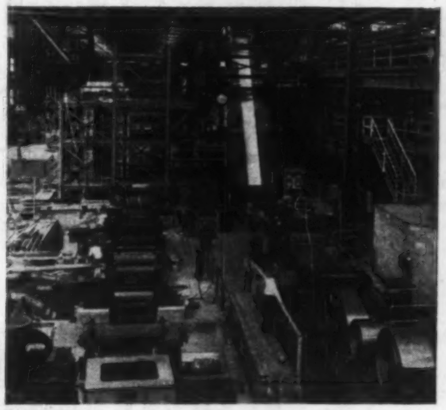
NEW YORK COLISEUM. During the year Bethlehem fabricated and erected 13,000 tons of steel and supplied 4000 tons of reinforcing bars for this project. In addition to the huge exposition hall with space as large as nine football fields and seating capacity for 10,000 persons, the Coliseum includes a 20-story office building.

MARMORA ORE. The first shipload of pelletized iron ore from Bethlehem Steel's new Marmora, Ontario, mine left for Lackawanna plant on May 11, 1955. This shipment followed nearly five years of exploration, construction and stripping activities at Marmora. It is expected that by the time full production has been reached, 1400 tons of iron ore pellets will be shipped each day.

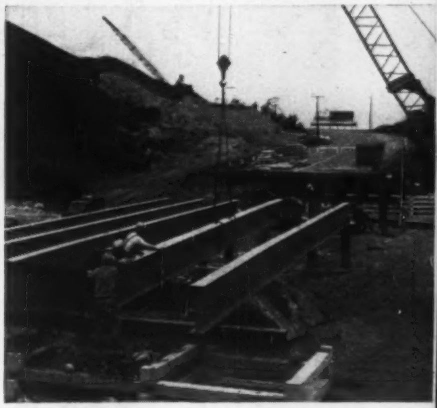


SENTINEL AT SEA. 110 miles east of Cape Cod in the open ocean stands the first steel "Texas Tower," a radar island which will flash warnings to the mainland in case of air attack. Built at Bethlehem's Quincy shipyard and fitted out at East Boston yard, the island of steel (shown during installation) was towed by powerful tugs to its permanent location at sea.

FLAT CARS FOR TRAILER TRUCKS. Two hundred special flat cars were built for the Pennsylvania Railroad's new "TrucTrain" service. Trailer trucks load at the shipper's doorstep, ride one of these cars to a terminal near destination, debark and deliver to the consignee's door. Bethlehem also built 50 cars for a similar service on the Erie Railroad.



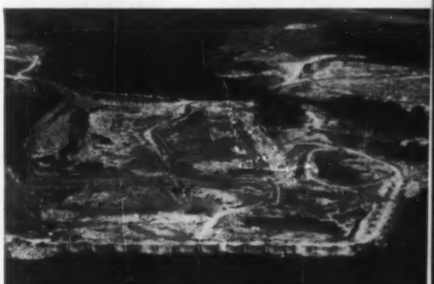
NEW FACILITIES. Among the new facilities under construction during 1955 were a 48-in. cold-reducing mill and additional equipment for the production of galvanized strip and tinplate at Sparrows Point plant, together with a new electric-weld pipe mill, and a new 160-in. sheared-plate mill. Various other facilities to expand capacity and improve production were added at other Bethlehem plants.



STEEL FOR FLOOD REPAIR. Soon after Hurricane Diane's disastrous flooding of vast areas in the Northeast, Bethlehem began making emergency shipments of steel. Thousands of tons of shapes, piling, reinforcing bars, and rails were rolled and rushed to stricken areas. Much of this steel came from the Bethlehem, Pa., plant, itself damaged by the flood.

SAFETY IN STEELMAKING. For the sixth consecutive year, the Bethlehem, Pa., plant won first place among large steel plants in the National Safety Council's contest. During the contest period the accident rate among the plant's 20,000 employees was so low that an employee's chance of injury in a normal eight-hour working day was only one in 237,000.

NEW FABRICATING WORKS. The construction industry in Southern California is now being served by Bethlehem Pacific's new fabricating works, completed in mid-1955 at Torrance, Calif., near Los Angeles. With three acres under roof, the new Torrance Works is the largest of Bethlehem Pacific's four fabricating works, with facilities for riveted, welded and bolted types of fabricated steel construction.



STEEL FOR ST. LAWRENCE POWER. More than 16,000 tons of Bethlehem steel sheet-piling were supplied during 1955 to the vast St. Lawrence River power project. The piling was used in cellular cofferdams at two locations, Long Sault (above) and Barnhart Island.

BETHLEHEM
STEEL

another revolutionary development by La Salle

THE NEW fatigue-proof STEEL BAR

gives HIGH STRENGTH... WITHOUT HEAT TREATING

"FATIGUE-PROOF" steel bars offer high strength in-the-bar . . *without the expense and trouble of heat treating.* Tensile strength is in the 140,000 to 150,000 p.s.i. range . . hardness, which is related to this strength level, is approximately 30 Rockwell "C."

"FATIGUE-PROOF" has uniform strength across the bar . . and this uniformity is maintained from bar to bar . . lot to lot. This remarkable uniformity of strength makes "FATIGUE-PROOF" ideal for applications in the 140,000 to 150,000 p.s.i. range that formerly required heat treated carbon and alloy steels, either hot rolled or cold drawn.

yet it's EASY TO MACHINE

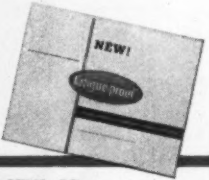
"FATIGUE-PROOF" machines at least 25% faster than annealed alloys . . 50% to 100% faster than heat treated alloys.

"FATIGUE-PROOF's" excellent machinability permits faster speeds, heavier feeds, better tool life . . your production rates will increase.

Distortion from machining is held to a minimum . . surface finish is greatly improved.

Our Sales Engineers will be happy to show you how you can cut costs and eliminate problems and provide samples for test purposes.

JUST PUBLISHED! Ask for your copy of this new 20-page booklet which gives additional information on the remarkable new "FATIGUE-PROOF."



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LA SALLE STEEL CO.
1414 150th Street
Hammond, Indiana

Please send me your "FATIGUE-PROOF" Bulletin.

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Title__________

Company__________

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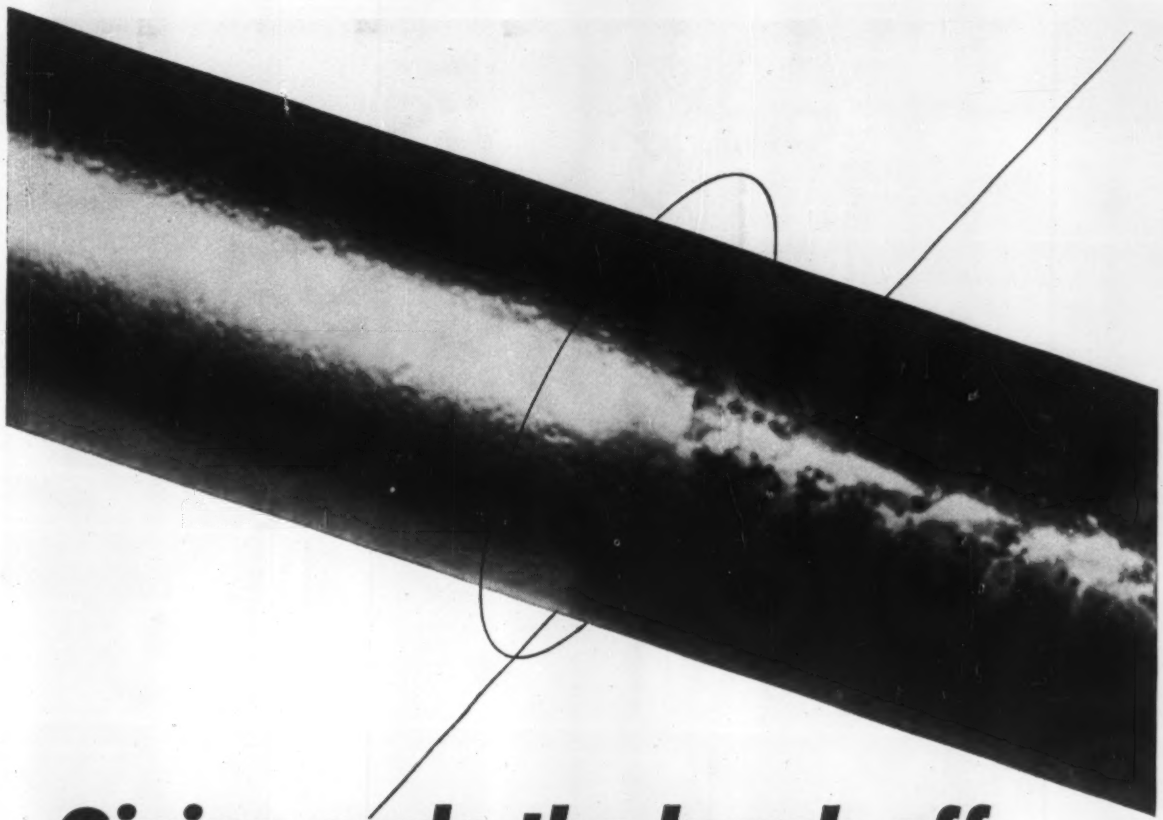
City__________ Zone____ State_____



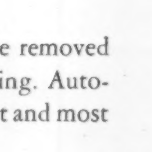
Giving scale the brush off

Automatic Brushing Machine inserts end of tube between brush rolls . . . cleans rotating tube on predetermined cycle . . . stops and ejects tube.

SCALE and hardened preservative oil must be removed from the ends of boiler tubes prior to welding. Automatic Osborn power brushing proved the simplest and most economical cleaning method.

This is typical of the many new—and often unique—cleaning and finishing operations being performed in virtually every industry by Osborn Power Brushing Methods.

An **O**sborn **B**rushing **A**nalysis, made in your plant, will show how *you* can improve metal cleaning operations with power brushing. Write *The Osborn Manufacturing Company, Dept. G-40, 5401 Hamilton Avenue, Cleveland 14, Ohio.*



COMPLETE DATA—For information on power brushes and brushing methods, write today for Osborn Catalog 300.

Osborn Brushes

OSBORN

BRUSHING METHODS • POWER, PAINT AND MAINTENANCE BRUSHES
BRUSHING MACHINES • FOUNDRY MOLDING MACHINES

MORE COPPER IS COMING

Never before has peacetime copper output been so great.

In 1955 alone, free world refined production totalled an estimated 2,732,997 tons. Yet even today's record tonnages will be exceeded as new copper mines swing into full production and existing properties expand operations.

On the African continent, substantially increased production is expected from Bancroft, Chibuluma, and Kilembe.

In South America, expansion at El Teniente, Chuquicamata and La Africana, has been announced. Under development are Cuajone, Toquepela, Quellevaco, and Indio Muerto.

In the United States (already the world's largest producer), San Manuel, Butte, Tripp, White Pine, Osceola, and Pima mines are headed for greater output.

Canada will add more production at Gaspé, Campbell Chibougamau and Opemiska. Many new properties are being developed. Substantial future output is expected from Brunswick, Geco, Granduc and Canam, to mention only a few of these new projects.

The copper industry has the capacity to produce copper faster than ever.

From known deposits . . . from mines now under development and from ore bodies now being explored . . . more copper is on the way. For particulars, write today to Copper and Brass Research Association, 420 Lexington Avenue, New York 17, New York.

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RESEARCH ASSOCIATION

. . . AN INDUSTRY SOURCE OF TECHNOLOGICAL AID, INCLUDING A LIBRARY OF TECHNICAL LITERATURE AND A COUNCIL OF SPECIALISTS.

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- Easy to machine, form, draw, stamp, polish, plate, etc.
- Welds readily . . . Excellent for soldering and brazing

STEEL
The Metalworking Weekly

JANUARY 2, 1956
Vol. 138 No. 1

1956 METALWORKING YEARBOOK ISSUE

$2.00 PER COPY

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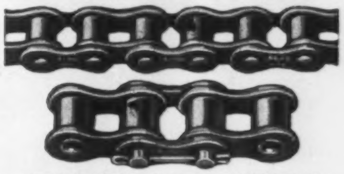
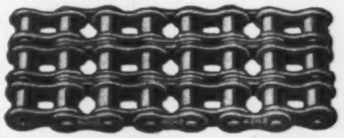
WRITE FOR THIS
FREE
TEXT

An accurate and useful 76 page compilation of chain data. A valuable textbook for engineers . . . grows to be indispensable. Free upon request to Dept. 10-K, ACME CHAIN CORP., Holyoke, Mass.

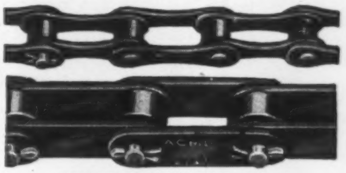
COMPLETE PRODUCTION FACILITIES AND PROMPT DELIVERY ON ALL THESE CHAINS



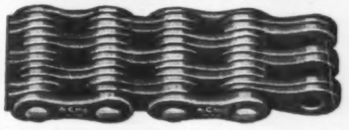
STANDARD ROLLER CHAINS
Available in pitches from 3/8" to 2½" riveted and detachable type.



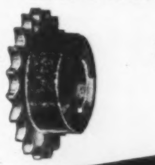
STANDARD MULTIPLE WIDTH
Multiple widths of six strand or wider available for special application.



DOUBLE PITCH CHAIN
For use in slower speed power transmission and material handling conveyors.



CABLE CHAINS
Acme Cable Chains are furnished in a variety of pitches, widths and strength.

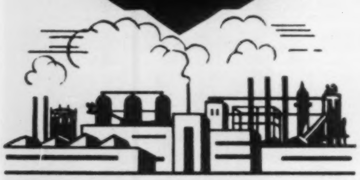


SPROCKETS
Acme Sprockets are available in a wide range of sizes, in all types.

PHONE JEfferson 2-9458.

Acme Chain Corporation
HOLYOKE
MASSACHUSETTS

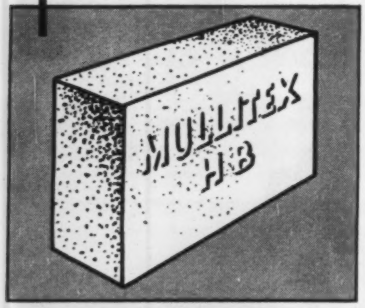
Walsh Points the Way . . .
TOWARD
A NEW
HORIZON
in
REFRACTORY
Performance



AN OPEN LETTER
TO THE
STEEL INDUSTRY

. . . consistent with refractory quality, Walsh is constantly striving to produce fire brick of higher bulk density and lower porosity. To you this is assurance of greater dollar value when you purchase refractories by Walsh.

Specialists in fire brick of high bulk density and low porosity.



WALSH
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101 FERRY STREET • ST. LOUIS 7, MO.
FOR OVER 60 YEARS MANUFACTURERS
OF HIGH GRADE REFRACTORIES

behind the scenes

Bless 'Em All, Says Mr. Shrdlu

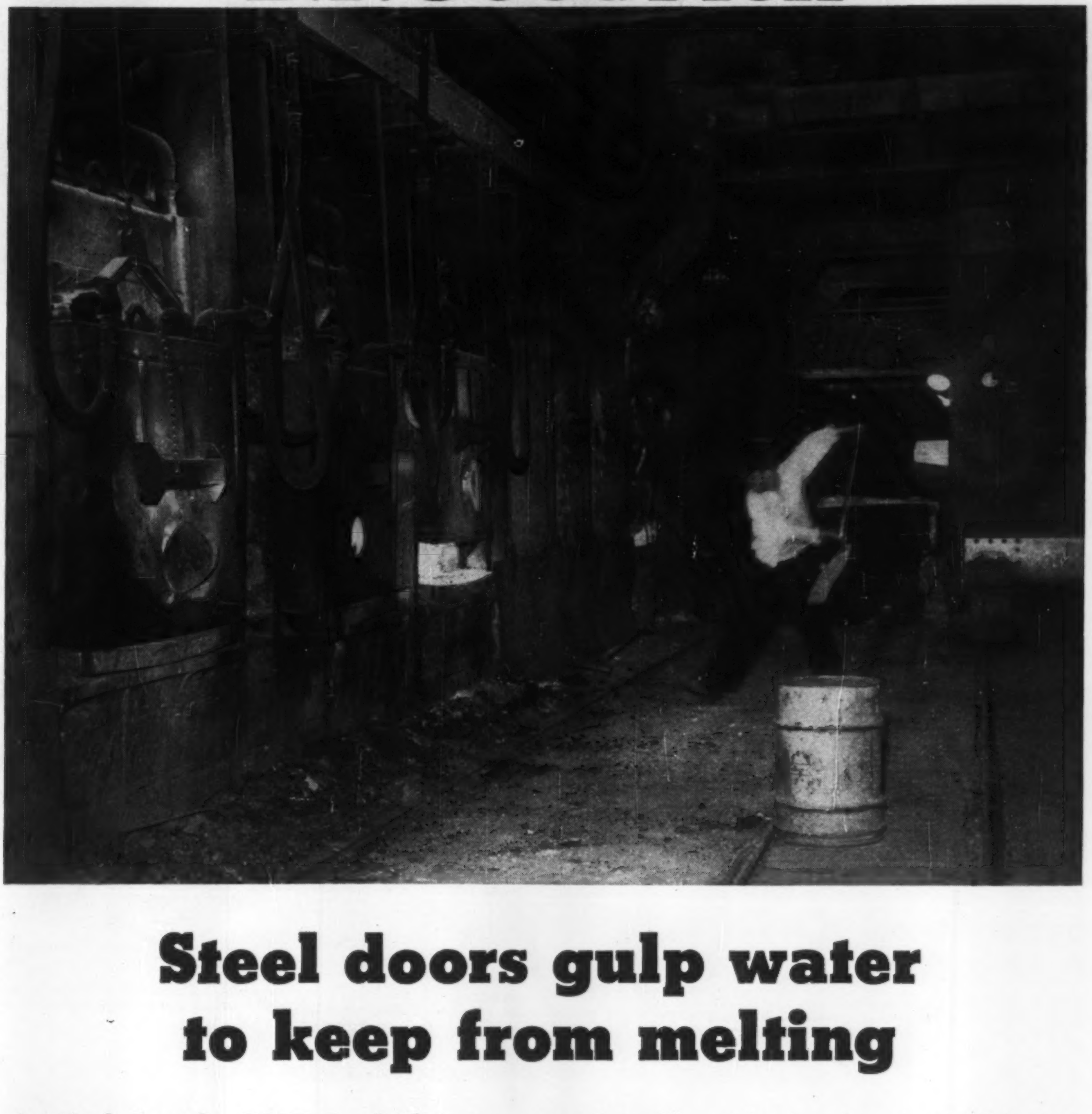
Up from countless desks this week
There'll echo, friends, a pond'rous creak
When STEEL, *bedecked in Yearbook guise,*
Falls heavily before your eyes
And crashes on your desk among
The other mail the postman brung.
This mighty tome, this classy book
Assembled with the forward look,
Is packed with metal facts anent
The problems faced by management.
Between its varnished covers you'll
Find items over which you'll drool—
Like facts and figures, prophesies
And guides, and hints and things like these.
The team that struggled to produce
This book for Metalworking's use
Includes a multigifted crew
To whom some hearty thanks are due;
The men and women, girls and boys
Whom Penton Publishing employs
To fashion Yearbook ev'ry year
Deserve, indeed, some lusty cheers.
The writers, then: We deed applause
To ev'ry pregnant phrase and clause.
And artists—let us tip our hats
And beam at them where e'er they're at.
The printers, too, may wipe their brows
And take a well deserved bow.
We thank the pressmen, who ignore
Our shouts above their presses' roar,
And eke the folks who fold and bind:
To them our thanks are well assigned.
And while we're at it, we'll extend
To all STEEL's *customers and friends*
The Season's Greetings, luck and cheer,
And wishes for a glad New Year—
And may we often, folks, convene
Each Monday here Behind the Scenes!

Shrdlu

STEEL
STEEL
Expansioneering

Metalworking Outlook—page 95

RESEARCH KEEPS **B.F.Goodrich** FIRST IN RUBBER



Steel doors gulp water to keep from melting

A typical example of B. F. Goodrich improvement in rubber

It's 3,000 degrees hot inside those steel mill furnaces. So hot that even the heavy steel doors would melt in minutes without protection. To cool them off, they make the doors hollow and pour water through in a constant flood.

But the doors must move up and down, so flexible hose is needed to feed water in and out. Hot metal spatters on the hose. Big "charging machines" bang it. Heat cooks it 24 hours a day, 7 days a week.

Rubber stand all *that?* B. F. Goodrich engineers believed it could, and designed a rubber hose armored with wire for strength and protected by asbestos for heat. Here's what happened when it was tried at the steel company in the picture.

Where other, more expensive hose burned out in a matter of months, or even weeks, the B. F. Goodrich hose is still good after more than a *year* of constant use. What's more, it is so much lighter, more flexible than other makes that workmen prefer it, and one man can install it where two were needed for other hose.

Finding a way to improve furnace door hose is an example of the B. F. Goodrich method of approaching a customer's problem. We have been able to solve equally difficult ones, just as successfully, in products you undoubtedly use. Your B. F. Goodrich distributor would like to tell you what these improvements are, and how they can be employed for your profit. *The B. F. Goodrich Company, Dept. M-535, Akron 18, Ohio.*

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a complete line of standard products and special steels.

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shearing, forming, torch cutting, blanking, metal sawing and other processing operations, to your specifications.

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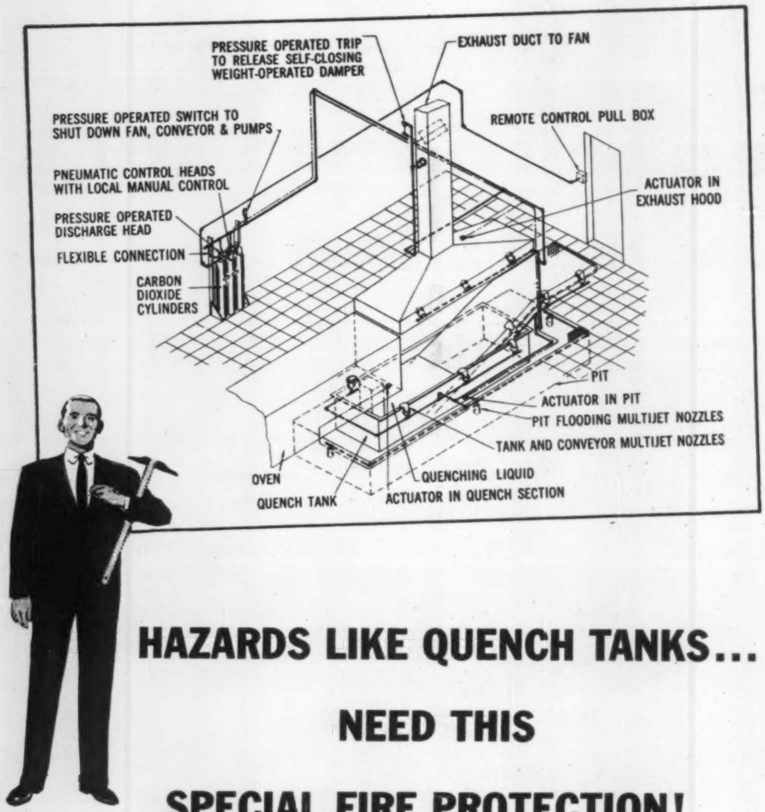
PRESSURE OPERATED TRIP TO RELEASE SELF-CLOSING WEIGHT-OPERATED DAMPER
EXHAUST DUCT TO FAN
PRESSURE OPERATED SWITCH TO SHUT DOWN FAN, CONVEYOR & PUMPS
REMOTE CONTROL PULL BOX
PNEUMATIC CONTROL HEADS WITH LOCAL MANUAL CONTROL
ACTUATOR IN EXHAUST HOOD
PRESSURE OPERATED DISCHARGE HEAD
FLEXIBLE CONNECTION
CARBON DIOXIDE CYLINDERS
PIT
ACTUATOR IN PIT
PIT FLOODING MULTIJET NOZZLES
TANK AND CONVEYOR MULTIJET NOZZLES
OVEN
QUENCHING LIQUID
QUENCH TANK
ACTUATOR IN QUENCH SECTION

HAZARDS LIKE QUENCH TANKS...

NEED THIS

SPECIAL FIRE PROTECTION!

IN THE PLAN ABOVE, you see a typical Kidde fire extinguishing system installation for the protection of one of industry's most dangerous fire hazards. However, *all* Kidde quench tank installations are not exactly like this one, since Kidde treats each quench tank as a *special* hazard which requires *special* fire protection!

Using safe, efficient carbon dioxide, Kidde systems snuff flames quickly, cleanly. The CO_2 leaves no mess to harm machinery or equipment, will not even damage work-in-process. And, thanks to patented Kidde rate-of-temperature-rise detectors, Kidde systems remain on guard 24 hours a day, completely independent of outside power sources.

Kidde systems use no clumsy mechanical triggering methods, have no falling weights. Pneumatic or Electrical Control Heads insure instant and complete CO_2 discharge. The moving parts of a Kidde system are self-enclosed for safety, need no replacement after a fire, have easy-to-read visual indicators which show at a glance if system is "set" or "released." What's more, special Directional Valves on the Kidde system let you protect more than one hazard from the same cylinder bank, giving you the most versatile protection on the market!

Without obligating yourself in any way, let the Kidde man analyze the fire hazards in your plant. Then let him show you our recommendations. For more information, write Kidde today.

Kidde

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LETTERS
TO THE EDITORS

No Future in Price Cutting

We have just read your editorial, "Why Cut Prices?" (Nov. 14, page 57), and agree wholeheartedly with your comments. We would appreciate 100 reprints.

The situation is such, that in some sections of the country and in some particular types of buildings, we have practically stopped issuing quotations on our hollow metal doors and frames. We see no future in accepting jobs at cost or below.

We are under the firm belief that there are still enough customers who demand quality merchandise and who are willing to pay the cost and a fair profit. As a result, we have been able to maintain our reputation and sales.

We often wonder if those of our competitors who seem to go into the market and buy jobs merely to pay for overhead know what their costs are.

C. Milton Griggs
Vice President
Trussbilt
Minneapolis

Comprehensive Coverage

Please forward two copies of the two-part article, "Heat Treating Dutile Iron" (Nov. 21, page 108 and Nov. 28, page 109). These articles are the most comprehensive to be published on this subject.

D. J. Genung
Metallurgist
Ross-Meehan Foundries
Chattanooga, Tenn.

Foreign Tools Hard To Sell

DOMESTIC
IMPORT

I was amused by the Machine Topics column of Nov. 14 (page 126). Apparently, your unusually good research department must have been out on a holiday.

For most government jobs, it is next to impossible to sell a foreign tool. Moreover, the effective and excellent sales staffs of the domestic builders generally see to it that requisitions are written in such a way that only one or two domestic tools will fill the bill.

One rarely sees a foreign machine tool in a mass-production line. Imported machine tools aren't accepted (if only for reasons of standardization) unless they have tremendous technological advantages to offer.

Looking at statistics, you will find that the domestic machine tool industry has consistently exported more machine tools than were imported. The case is not for import restrictions, but rather for liberalized trade.

How would we feel if the Europeans suddenly imposed import quotas?

In its own enlightened self-interest, the American machine tool industry is

(Please turn to page 12)

ALLEN
MANUFACTURING COMPANY
Hartford 2, Connecticut, U.S.A.
ALLEN HEAD

Pressur-Forming

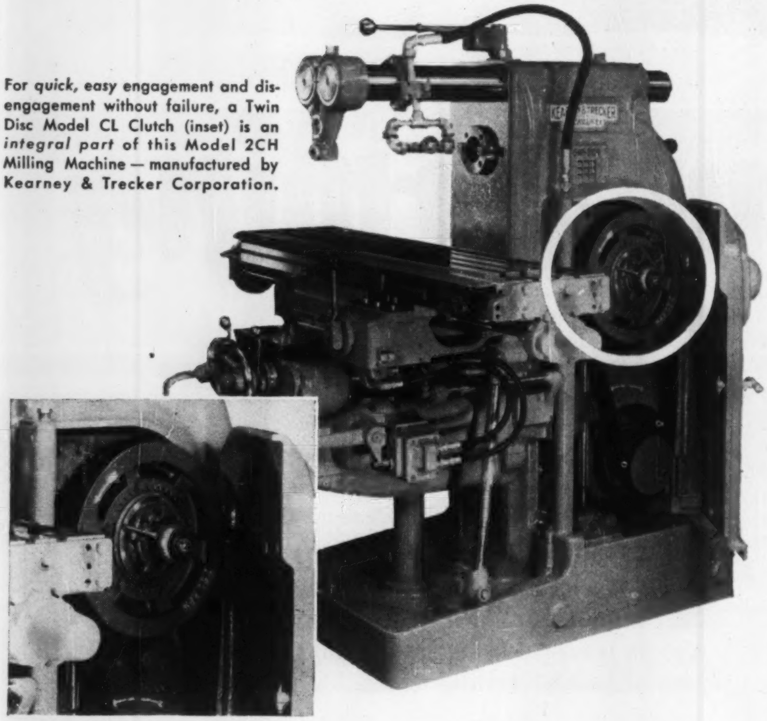
ASSURES A BETTER FIT, GREATER STRENGTH, LONGER LIFE

ALLEN originated the cold forging method of precision screw production. Today's advanced methods result in a combination of tremendous strength, fatigue resistance and precision.

Pressur-forming preserves the tough fibers of Allenoy steel continuous, uncut and concentrated where strength is needed most . . . conforming to the contours of head, socket and threads.

NOW WITH THE LEADER POINT Allen's exclusive unthreaded leader point makes starting easier and protects against cross threading or damage if the screw is accidentally knocked or dropped. Your Allen Distributor provides a "local warehouse" for Allen fasteners — plus a storehouse of fastening know-how. Call him for unbeatable service or write the factory direct for engineering information.

Allen 'pressur-formd' cap screws are standard stock items in sizes from No. 4 thru 1 in. Flat head cap screws, No. 4 thru ¾ in. Both N. C. threads. Many sizes are also standard in stainless steel, or in Allenoy steel with N. F. threads.



For *quick, easy* engagement and disengagement without failure, a Twin Disc Model CL Clutch (inset) is an *integral part* of this Model 2CH Milling Machine — manufactured by Kearney & Trecker Corporation.

Twin Disc Clutches used by Kearney & Trecker *for 35 years!*

Since 1920, Kearney & Trecker Corporation — *progressive* manufacturer of machine tools—has incorporated Twin Disc Friction Clutches in many of its models.

A typical example is the Model 2CH Milling Machine, which is just *one of* 28 such machines that they manufacture. *An integral part* of the 2CH is a Twin Disc Model CL Clutch. This clutch provides *quick, easy* engagement and disengagement without failure — positive control and trouble-free performance. Overall dimensions have been held to a minimum to conserve space. Action parts are hardened and ground, and wide friction surfaces are used. High grade molded asbestos friction material and highly finished surfaces on the clutch plates *reduce* wear and *assure* smooth, efficient operation.

Specify Twin Disc Clutches for your equipment . . . as Kearney & Trecker has done so satisfactorily for the *past 35 years!* Write *now* to Twin Disc Clutch Company, Racine, Wis. Request Bulletin 120-D.

TWIN DISC
CLUTCHES AND HYDRAULIC DRIVES
TWIN DISC
Friction Clutches and Fluid Drives

TWIN DISC CLUTCH COMPANY, Racine, Wisconsin • HYDRAULIC DIVISION, Rockford, Illinois

Branches or Sales Engineering Offices: Cleveland • Dallas • Detroit • Los Angeles • Newark • New Orleans • Tulsa

LETTERS

(Concluded from page 10)

much better served by insisting on fully reciprocal trade on a liberal basis than by trying to impose a "continental blockade." If we impose restrictions to shut out foreign tools, the Europeans could easily impose similar restrictions which will shut out twice as many American tools.

Total imports average only about 2 per cent of domestic production. The notion of the domestic industry being hurt by any such small fraction of the total is obviously farfetched.

We, as Americans, must get used to the idea that we are the world's creditor nation and that we cannot expect to export unless we also import. One of the burdens of world leadership is to use some common sense.

K. Orban
President
Kurt Orban Co. Inc.
Jersey City, N. J.

Up to the Minute

Please send three copies of the story, "Lacquer Boosts Vacuum Finishing" (Dec. 5, page 124).

Incidentally, I'm an enthusiastic reader of STEEL because it is up to the minute on happenings in Washington, Detroit and industry in general.

G. Stevenson
Chief Engineer
Conmar Products Corp.
Newark, N. J.

Reprint Service Appreciated

REPRINT
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STEEL

We would appreciate three copies of the article, "Iron Ore Supplies Will Outlast Us" (Nov. 7, page 87) and two copies of the two-part article, "The New Materials Market" (Oct. 31, page 66 and Nov. 7, page 158).

Our interest in these articles reflect our high opinion of your magazine, and we sincerely appreciate this extra service.

John E. Hough
1800 Sun Life Bldg.
Montreal, Que.

Compact Metal Reference

Please furnish us three copies of your Metal Selector (Oct. 10 insert). We have found it to be a complete, compact reference and wish to commend you on making the item available.

A. D. Pridgeon
Sales Engineer
Benton Harbor Malleable Industries
Benton Harbor, Mich.

Article to Sales Force

We would like 20 reprints of the two-part article, "Beyond the Metals" (Aug. 1, page 72 and Aug. 8, page 73), to distribute to our sales force and some of our technical personnel.

A. Maupin
Assistant to President
Chas. Taylor Sons Co.
Cincinnati, O.

Why deep draws with

Weirzin

electrolytic zinc-coated sheets

provide important manufacturing economies

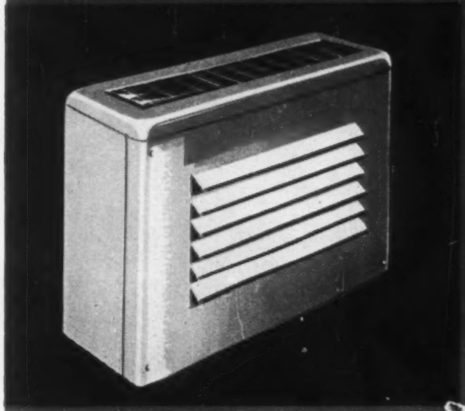
Because Weirzin has been proved to retain its amazingly uniform protective coating under extreme fabricating operations, it is specified by leading manufacturers for a wide variety of products.

Drawing and forming are performed rapidly, with complete absence of flaking, cracking, or peeling. Inventory losses due to rust are materially reduced. Heat and moisture are successfully resisted. Absence of underfilm corrosion assures not only longer life, but also adherence of paint, lacquer, enamel and lithograph ink. And, for even longer adhesion, chemically treated Weirzin is available.

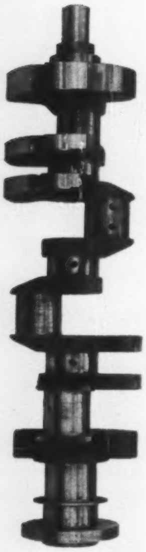
When the job calls for difficult deep draws, specify Weirzin and enjoy the double advantage of quality and economy.

WEIRTON STEEL COMPANY
Weirton, West Virginia

NATIONAL STEEL CORPORATION



WEIRTON STEEL COMPANY



if 4½ percent interest is "gilt-edge"

To many investors, a conservative security that consistently yields 4½% is considered "gilt-edge." But here is an investment that consistently yields 50% or more a year—with no risk to you.

To drill oil holes in this crankshaft with standard equipment and obtain 46 cranks/hr. would take many machines and operators.

With the Avey machine and one operator, unit costs drop so far that the machine is paid for in less than 18 months.

The 14-station machine has Line-O-Dex indexing, automatic hydraulic clamping and positioning, and drills ¼" holes with Avey-draulic Torquematic deep hole drilling units.

When this order is complete, or the part changes in design, the Avey standard units can be rearranged for a new job ▶*an economical way to extend the life of your investment.*

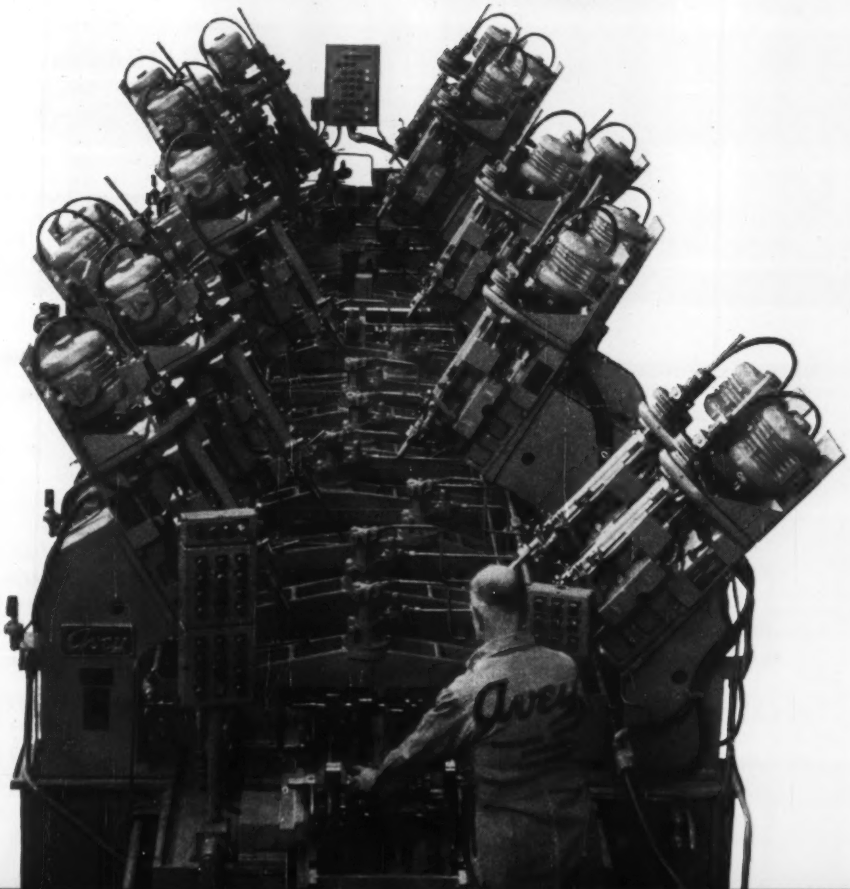
Avey's pay-as-you-produce plan helps you make this fast-earning investment now. Whether your part is a crankshaft or a door check—ask Avey for a *profit prediction.*◀

THE AVEY DRILLING MACHINE CO., CINCINNATI 1, OHIO

drilling, tapping, production machines

... what's 50 percent?

Avey



HAND PROTECTION

Measure glove cost by PERFORMANCE . . . not PRICE!

The difference between *first costs* and *replacement costs* is the difference between ordinary work gloves and Jomac Gloves. While bargain buys are wearing out and are being replaced, sturdy Jomacs are being used, cleaned or reconditioned, and reused again and again. Jomac quality means better service, longer life, lower *net* costs.

SAVE with JOMACS

Jomac manufactures all types of hand and forearm protection — all made from famous loop-pile Jomac Cloth. This porous fabric cushions hands against sharp metal, insulates them against extreme heat. Get full details. Write for the new Jomac Industrial Work Gloves Catalog. Jomac Inc., Dept. E, Phila. 38, Pa.

JOMAC

INDUSTRIAL WORK GLOVES

PROOF that quality means economy

STEEL

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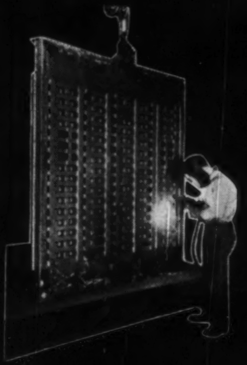

WELDING SOLVES ANOTHER WEIGHT PROBLEM

(and USS "T-1" Steel solves the welding problem!)

Bedplates for modern color-printing presses have to be rugged—but as lightweight as possible. They must withstand constant pounding from printing rollers and cutting knives. And, since they move back and forth continually, they've got to be lightweight for fast, efficient operation. It is a good place to use a welded assembly of steel plate.

But that's where Graver Tank & Manufacturing Co., Inc., ran head-on into a tough fabrication problem. Alloy steel with the necessary strength and durability was difficult to weld. And with 534 welds to make on *every* bedplate, this was a king-size headache.

NO MORE HEADACHE!

Now the headache is gone. Production costs are down. And the finished bedplates are working hard and long . . . taking a tremendous daily pounding without distortion.

The solution? Just a switch to a remarkable *new* alloy steel, USS "T-1" Steel.

"T-1" Steel is very strong. Very tough. Able to take vicious impact abuse. Yet, it's easy to weld," says Mr. H. McDonald, Superintendent at Graver.

HOW ABOUT YOU?

If you have tough jobs, rugged jobs, where you want to weld your way to lower costs, give this new steel a try. We think you, like Mr. McDonald, will find it the best thing you have ever used. Right now, "T-1" is in service and doing well in bridges, power shovels, steam turbines, electrical transformer tanks, flywheels, pressure vessels, mine cars, and lots of other places. Write for details. United States Steel, Room 5089, Pittsburgh 30, Pa.

"TOP QUALITY" That's how Graver Tank & Manufacturing Co., Inc., East Chicago, Indiana, describes new USS "T-1" Steel. It gives them a yield strength of 90,000 psi . . . exceptional resistance to impact abuse . . . and good weldability. It enables them to build extremely rugged, all-welded bedplates for printing presses.

UNITED STATES STEEL CORPORATION, PITTSBURGH • COLUMBIA-GENEVA STEEL DIVISION, SAN FRANCISCO
TENNESSEE COAL & IRON DIVISION, FAIRFIELD, ALA. • UNITED STATES STEEL SUPPLY DIVISION, WAREHOUSE DISTRIBUTORS, COAST-TO-COAST
UNITED STATES STEEL EXPORT COMPANY, NEW YORK

USS "T1" CONSTRUCTIONAL ALLOY STEEL

6-15

UNITED STATES STEEL

"A Tough Job Today-Routine Tomorrow"

says
R. O. Thomas
U. S. Steel's
Forging
Superintendent

THE PICTURE SHOWS the very heart of a horizontal extrusion press being built by the Loewy Construction Company for the Air Force heavy press program. It is the press container—forged, machined and assembled at the U.S. Steel Homestead Forgings Division.

It is the container which must sustain the high pressures exerted on the hot billet as it is forced through a die to form the extruded shape. In extruding an aluminum alloy, for example, the container itself is electrically heated to above the 800° F temperature of the billet—hot enough to soften ordinary steels.

This container is made by shrinking together several steel sleeves, similar to the way big naval guns are constructed. The result is an extremely strong assembly without undue bulk, able to withstand the tremendous pressure exerted during extrusion. The liner (the highly polished inside part), primarily a heat resistant member, is forged from tungsten-chromium-molybdenum-steel, heat treated to a very high hardness to resist deformation. Over this liner is a heavy forged alloy steel liner holder. Next come five forged alloy steel rings that build the total outside diameter to over six feet.

When this press was first proposed, some segments of the industry felt that it would be most difficult, if not impossible, to meet the specifications. In answer, the first units have been shipped from the Homestead Forgings Division after passing all requirements . . . and more units are on the way.

If you would like a free copy of our 32-page booklet that gives the background of USS Quality Forgings, write to United States Steel, Room 5089, 525 William Penn Place, Pittsburgh 30, Pennsylvania.

SEE THE UNITED STATES STEEL HOUR. It's a full-hour TV program presented every other week by United States Steel. Consult your newspaper for time and station.

**UNITED
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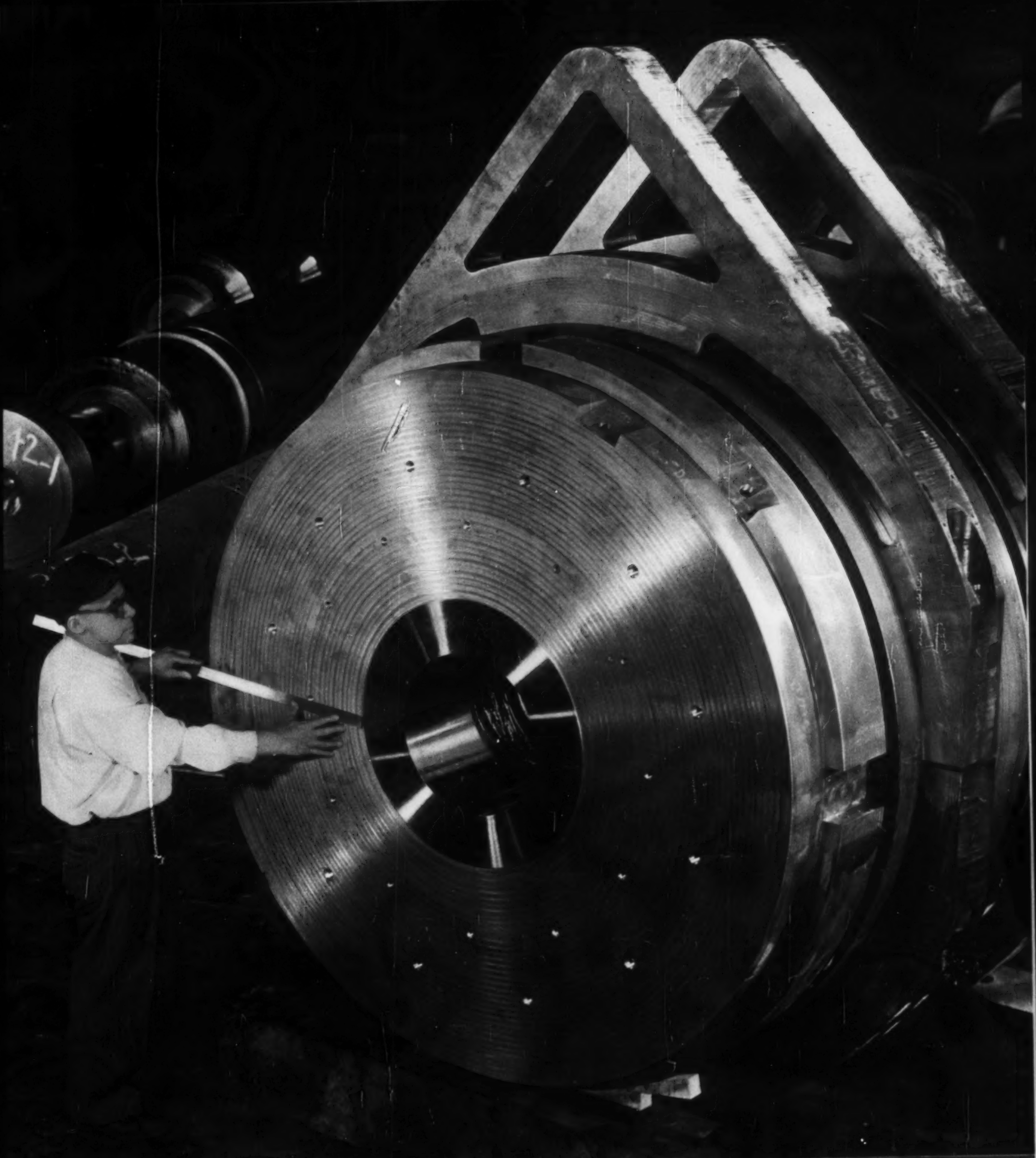
STEEL**



USS

Quality

FORGINGS

heavy machinery parts—carbon, alloy, stainless

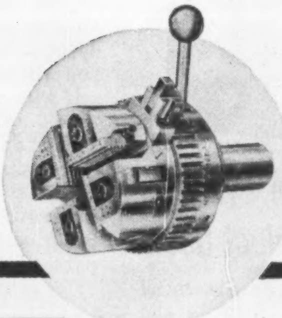
forged steel rolls and back-up roll sleeves

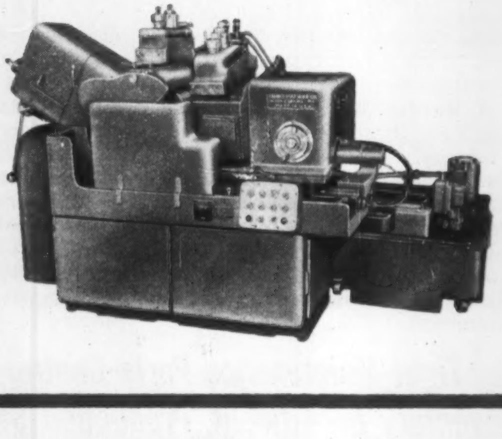
electrical and water wheel shafts

hammer bases and columns

LANDIS

Cutting, Grinding, Tapping,





Cutting....

The 8C LANDMACO—one of five new Thread-Cutting machines designed for precision threading of workpieces from $\frac{3}{16}$" to $6\frac{5}{8}$" in diameter. ● Above is the new 2" LANDMATIC—one of the many Standard and Special Thread-Cutting Heads designed for application to Automatics and Turret Lathes.

Grinding....

The CENTERLESS Thread Grinder for continuous thru-feed grinding of threads from $\frac{1}{16}$" to 2" in diameter at mass production rates. Infeed grinding attachment available for threading shouldered or headed workpieces which cannot be cut or rolled due to material hardness.

Rolling THREADS

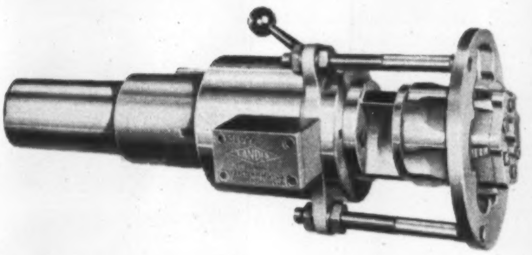
More than 350 sizes and styles of Machines and Tools are manufactured by LANDIS for producing all types of internal and external, straight and tapered threads by one of these three basic threading methods.

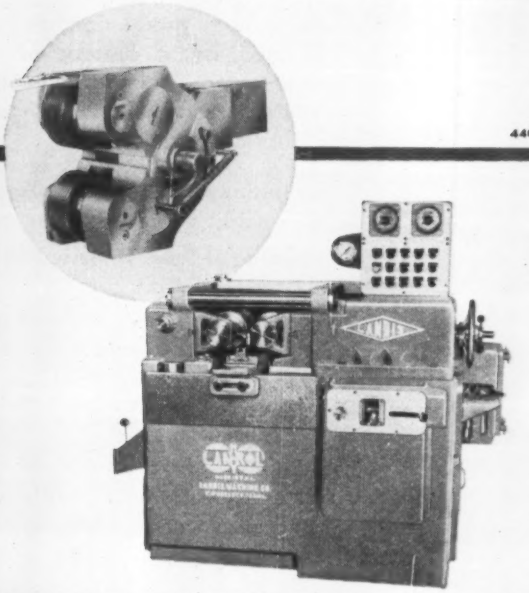
This extensive line of Threading Equipment is the result of more than 50 years of research and development—exclusively in the field of Thread Generation. Our most recent additions include the revolutionary LANHYROL Thread Rolling Machine, the new Model C LANDMACO Bolt Threading Machines, and the #1 Automatic Nipple Threading Machine. We are the largest company in the world today devoted entirely to manufacturing equipment for producing threads—by Cutting, Grinding, Rolling, or Tapping.

The Threading Experience developed through these years is an important LANDIS extra available to all manufacturers. Our Engineering Department will be glad to work with your organization on any problem dealing with method, equipment, or thread design. Send us your specifications—let us recommend the Threading Equipment best suited to your need.

LANDIS *Machine* COMPANY
WAYNESBORO • PENNSYLVANIA • U. S. A.

440-2-C





Tapping....

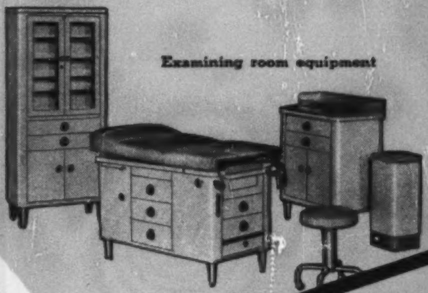
The LL Collapsible Tap for producing internal tapered threads featuring detachable heads for wide range coverage. Other LANDIS Taps include Rotary or Stationary Standard Taps for straight or tapered threads, Solid Adjustable Taps, Valve Taps, and Taps for other special applications.

Rolling....

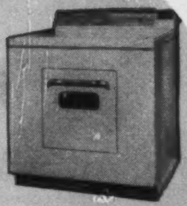
The new LANHYROL Thread Rolling Machine, revolutionary in its output, accuracy and flexibility. • Above is the #20 LANROLL Attachment—one of five sizes of Thread Rolling Attachments for Automatics and Turret Lathes.

at HAMILTON MFG. CO.

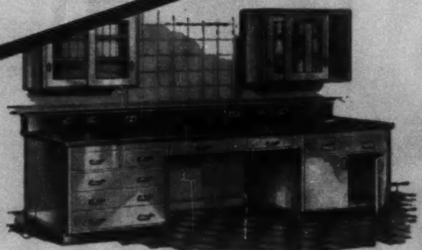
Two Rivers, Wis.



Examining room equipment



Home laundry clothes dryer



Steel laboratory equipment

Accurate high production, at low cost, is maintained by a battery of Cincinnati Shears—in the manufacture of Hamilton automatic washers and dryers, hospital and laboratory equipment.

These money making Cincinnati features have brought results—

- **Durable All-Steel Interlocked construction.**
- **Automatic Pressure Lubrication.**
- **Accurate Back Gauge.**
- **Powerful Hydraulic Holddowns.**
- **Inclined Ram.**

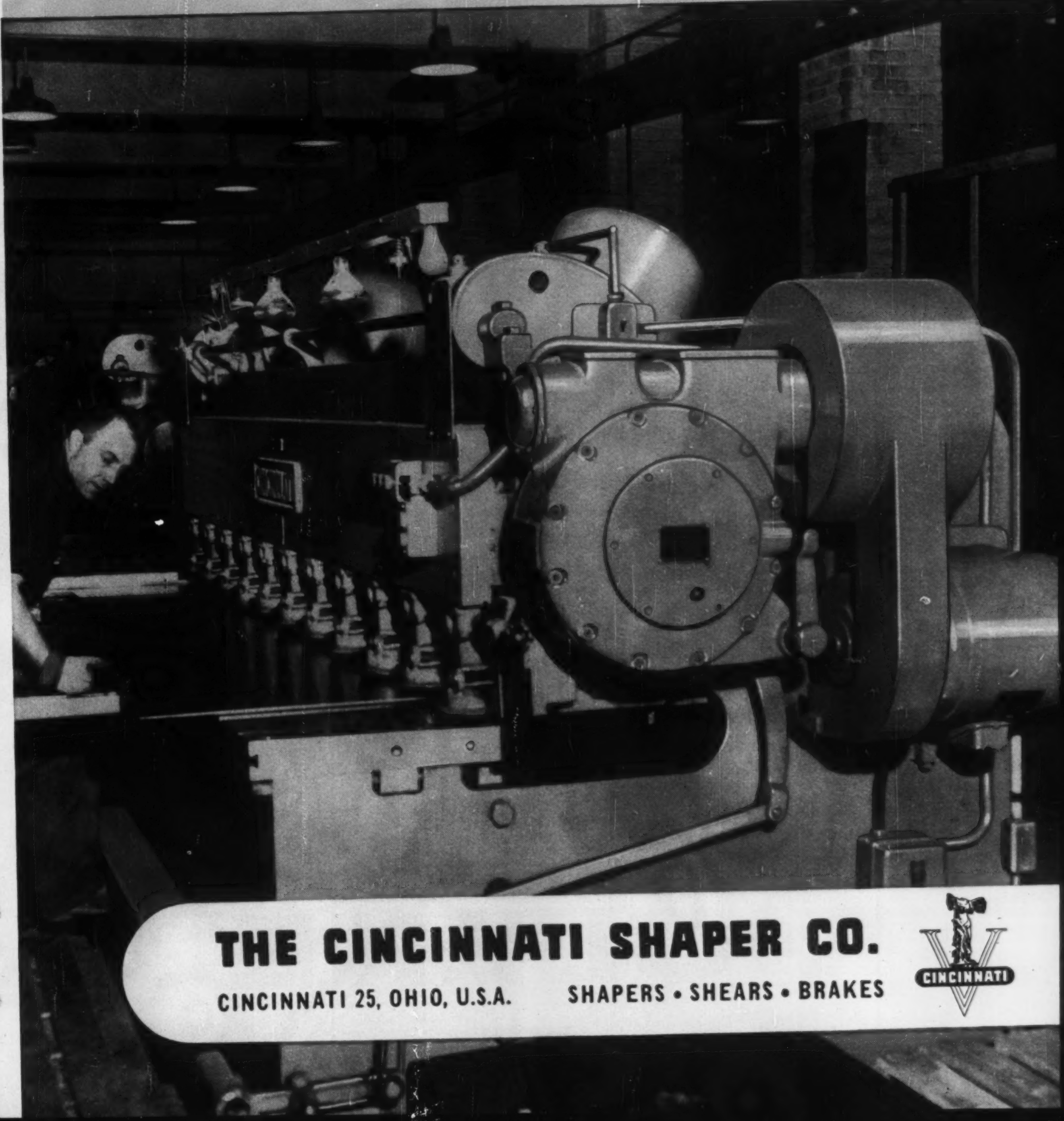
Cincinnati Shears accurately cut various thicknesses of material, without a change in knife clearance—this is a profitable time saver.

Photos courtesy the Hamilton Mfg. Company, Two Rivers, Wisconsin.

New front controlled power back gauges are now standard equipment on ALL CINCINNATI SHEARS.

Investigate these modern money making tools. Write for Catalog S-7.

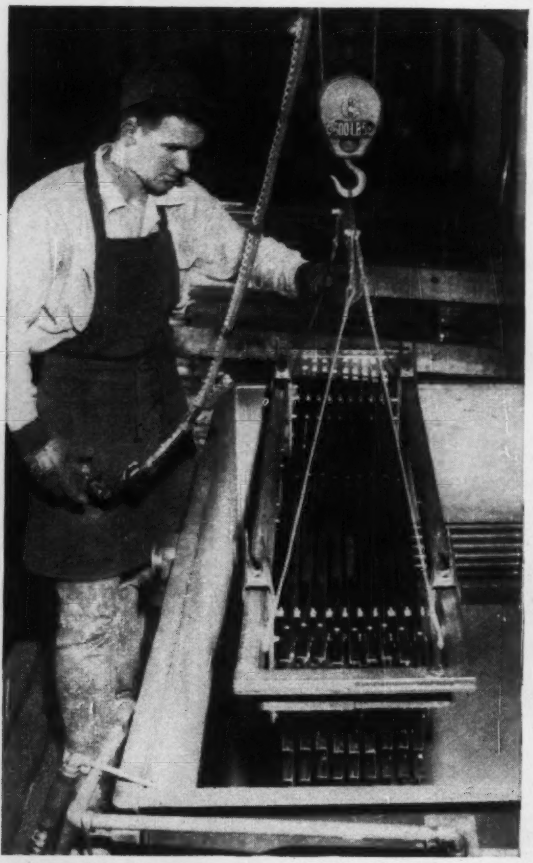
...25,000,000 lbs. of steel sheared by cost cutting CINCINNATI SHEARS



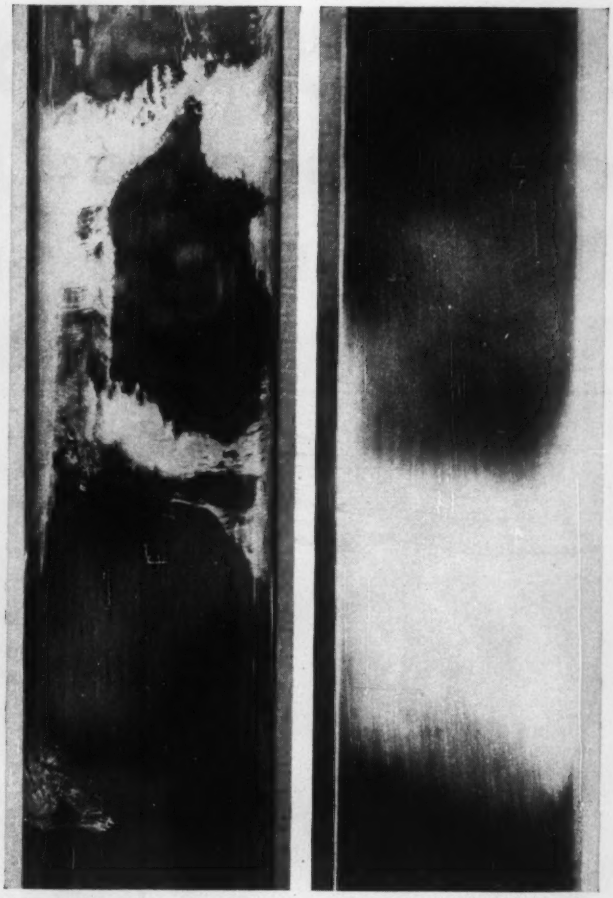
THE CINCINNATI SHAPER CO.

CINCINNATI 25, OHIO, U.S.A. SHAPERS • SHEARS • BRAKES

CINCINNATI



ALUMINUM shower enclosure parts are removed from the degreaser at Hecker Manufacturing Company, San Francisco, California. Buffing compound sludge and dirt are removed rapidly by vapors of "TRICLENE" D trichlorethylene.



CLOSEUP of aluminum parts before and after cleaning with "TRICLENE" D. Note bright, stain-free appearance of the highly polished aluminum.

"No etching of aluminum with TRICLENE® D in the degreaser"... *says Clyde Cary, Plant Superintendent,* HECKER MFG. COMPANY

"... and with 'TRICLENE' D trichlorethylene, there's no more adding stabilizers." Mr. Cary goes on to say, "What's more, we've been able to increase the time between degreaser cleanouts from every 3 or 4 days to 2 weeks."

Aluminum parts of these attractive modern tub and shower enclosures are highly polished, and when the degreasing solvent formerly used developed a high acid content—a frequent occurrence—rejects due to etching and staining mounted. Frequent degreaser cleanouts were necessary, and a close watch had to be kept over the solvent pH.

"Since changing to 'TRICLENE' D," Mr. Cary concludes, "we've noticed a big reduction in the number of rejects ... and we have no solvent control problem at all. All this adds up to real savings in maintenance and production costs."

Locked-in stabilizers give "TRICLENE" D unsurpassed resistance to all major causes of solvent deterioration—heat, light, air, acids and aluminum chloride—yet this rugged solvent contains nothing to harm even delicately machined metal surfaces. "TRICLENE" D gives brighter cleaning of any metal, distillation after distillation ... yet it costs no more!

FOR MORE INFORMATION on "TRICLENE" D and how it can bring a new standard of efficiency to your vapor-degreasing operation, write: E. I. du Pont de Nemours & Co. (Inc.), Electrochemicals Dept., Wilmington 98, Delaware.

DU PONT

REG. U. S. PAT. OFF.

BETTER THINGS FOR BETTER LIVING ... *THROUGH CHEMISTRY*

TRICLENE® D

TRICHLORETHYLENE

'56 Show Dates Set

THE NEW exposition year will be ushered in by the Plant Maintenance & Engineering Show in Philadelphia's Convention Hall, Jan. 23-26. One of the largest industrial shows in the nation, it will attract more than 20,000 executives. Clapp & Poliak Inc., New York, will manage the affair.

"Tooling for Tomorrow" is the theme of the American Society of Tool Engineers' biennial Industrial Exposition, Mar. 19-23. Chicago's International Amphitheatre will house the society's 24th annual convention and the exposition.

The first Design Engineering Show will be launched in Philadelphia's Convention Hall May 14-17. Devoted exclusively to the needs of engineers who design products for consumer and industrial uses, it is an outgrowth of the Basic Materials Exposition. Clapp & Poliak Inc. will handle this one, too.

The Society of the Plastics Industry will hold its seventh National Plastics Exposition, June 11-15. It will be held in New York City's new Coliseum building. This building will house the Annual Instrument - Automation conference and exhibit from Sept. 17-21. The Instrument Society of America will sponsor this one.

Cleveland will host three major industrial shows. The first, June 5-8, will be the Material Handling Institute's all-industry exposition It will be followed on Sept. 25-28 by the Association of Iron & Steel Engineers' biennial exposition and convention. A week later, Oct. 8-12, the American Society for Metals' annual National Metal Congress and Exposition will take over. All three will be at Cleveland's Public Auditorium.

The packaging industry will have two big shows. The American Management Association's Silver Anniversary National Packaging Exposition will be held Apr. 9-12 in Convention Hall, Atlantic City, N. J.; from Sept. 11-14, the Packaging Machinery & Materials Exposition will take place in Cleveland's Public Auditorium. Hanson & Shea, Pittsburgh, will manage it.

For other meetings and exhibits, see page 399.

For ultra-precision machining plus attractive finish Look to **WESTERN**

Western makes dozens of component parts, of which the above are a few examples, that play a part in making today's homes more efficient *and* more attractive. Home appliance and plumbing parts must work right and look bright.

Your requirements may be for smaller or larger pieces than those shown above. Western's capacity ranges from 1/16" to 4 7/8" round, with *all* necessary finishing equipment for secondary operations such as milling, drilling, threading, tapping, heat-treating and grinding—also special finishes such as cadmium, zinc and copper plating.

For fast, reliable delivery, precision quality, attractive finish and low cost, it pays you to put WESTERN on your production team.

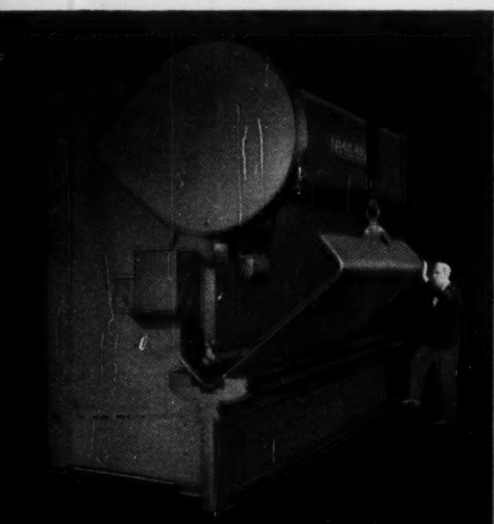
Why not send us your blueprints for quotation - - - today?

The Western Automatic
Machine Screw Company
division of Standard Screw Company
377 Woodland Ave., Elyria, Ohio

Precision Screw Products, Parts and Assemblies Since 1873

In plate or sheet metalworking . . .

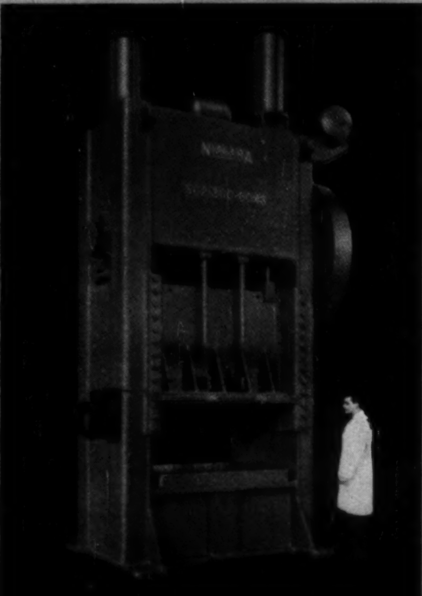
NIAGARA MACHINES CAN

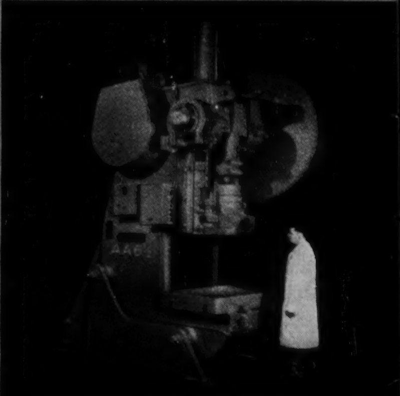

PRESS BRAKES
50 - 775 ton capacities.

COMBINATION CIRCLE SHEARS AND FLANGES
High speed machines handling a wide
range of medium to heavy work.

GAP FRAME DOUBLE CRANK PRESSES
3 - 6½ inch shaft diameters.
48 - 222 ton capacities. Also, inclinable series.

BENDING ROLLS
Hand and power driven for a wide
range of lengths and thicknesses.

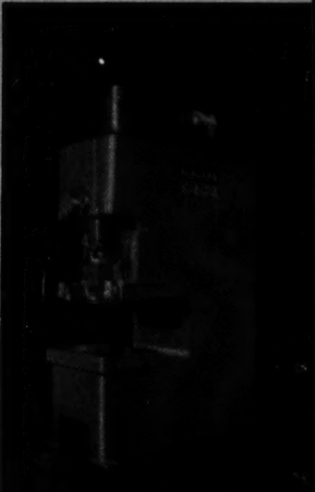

STRAIGHT SIDE DOUBLE CRANK PRESSES
50 - 300 ton capacities.


SINGLE CRANK OPEN BACK INCLINABLE PRESSES
1¼ - 7½ inch shaft diameters.
7 - 250 ton capacities.

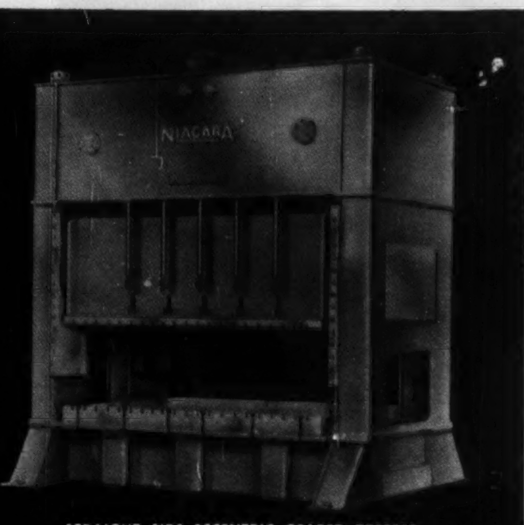
STRAIGHT SIDE ECCENTRIC GEARED
PRESSES MODIFIED AND EQUIPPED
FOR AUTOMATION
1, 2 and 4 point suspension.
100-1000 tons.

FRONT-TO-BACK CRANKSHAFT
OPEN BACK INCLINABLE PRESSES
Standard and automation models.
75-200 tons.

FRONT-TO-BACK CRANKSHAFT
ADJUSTABLE BED PRESSES
Standard and modified models.
22-150 tons.


FRONT-TO-BACK CRANKSHAFT
DEEP THROAT PRESSES
22-150 ton capacities

DO THE MOST* FOR YOU



STRAIGHT SIDE ECCENTRIC GEARED PRESSES
One, two and four-point suspension.
100 - 1000 ton capacities.

UNDERDRIVE POWER SQUARING SHEARS
Shim stock to 1 inch capacities in
lengths from 3 - 20 feet.

* MOST EXTENSIVE LINE:

From giant, power-operated machinery to small hand tools

* MOST ADVANCED DESIGNS:

Years ahead in performance through forward-thinking engineering

In the world's largest automotive and appliance plants or the smallest of sheet metal shops, Niagara machines and tools are usually at work "in force."

Batteries of giant presses are teamed up with speedy ring and circle shears. Massive, rugged press brakes stand side-by-side with powerful bending rolls and squaring shears. Versatile lever punches, rotary machines, groovers and seamers . . . all operate together to produce a better product at lower cost. The Niagara lines are "companion lines" of metalworking machines and tools that work together. A Niagara-equipped shop or plant is years ahead in quality and volume of production.

Whatever you require — power presses or hand tools — Niagara is the line that can do the most for you. It is the most complete in the industry . . . the most advanced in engineering. You can consult a Niagara representative with complete confidence of unbiased recommendations. Niagara has the right machines and tools for your requirements.

NIAGARA

America's Most Complete Line of Presses,
Shears, Machines and Tools
for Plate and Sheet Metal Work

POWER PRESSES • PRESS BRAKES • POWER SQUARING SHEARS • ROTARY MACHINES • SLIP ROLL FORMERS • POWER ROTARY SHEARS • DRUM MAKING EQUIPMENT • ELECTRONIC AUTOMATIC WELDERS • GROOVERS AND SEAMERS • HAND OR FOOT OPERATED SHEARS • FOLDERS-BRAKES • LEVER SHEARS AND PUNCHES • HAND TOOLS

BRING YOUR FILES UP-TO-DATE WITH INFORMATIVE NIAGARA BULLETINS

A diversified and extensive list of machines and tools make up the famous Niagara line. Some of the principal types are illustrated. Be sure that you have the latest data on the ones that apply to your work. At your request, specific Bulletins will be mailed promptly.

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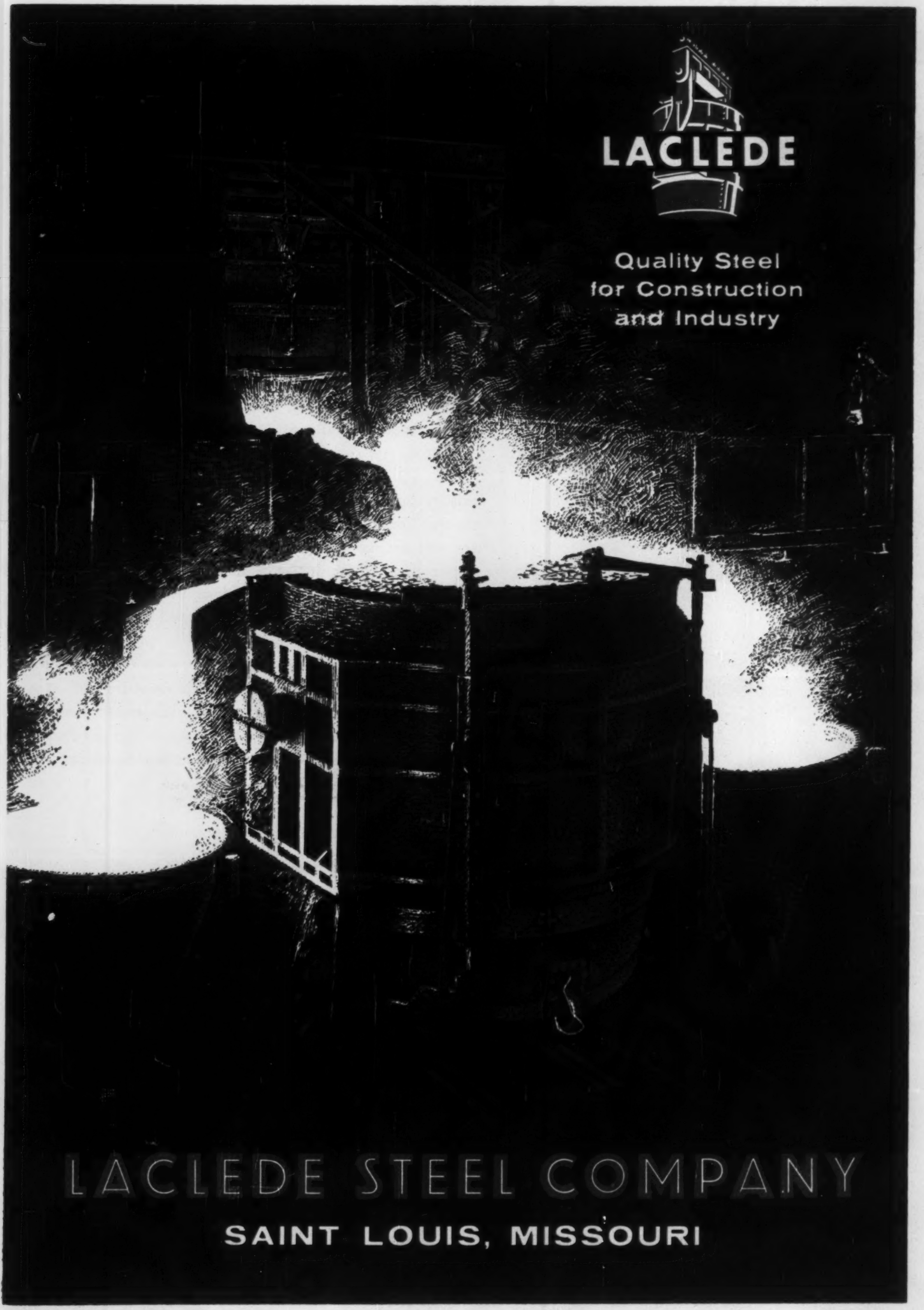
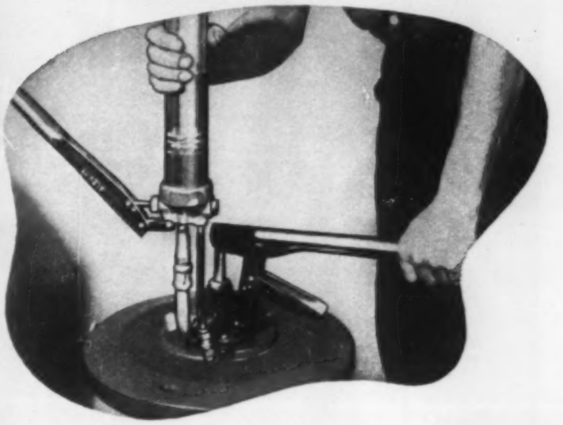

LACLEDE
Quality Steel
for Construction
and Industry
LACLEDE STEEL COMPANY
SAINT LOUIS, MISSOURI

YOUR PRODUCTION GOES UP...

when you switch lubrication methods from

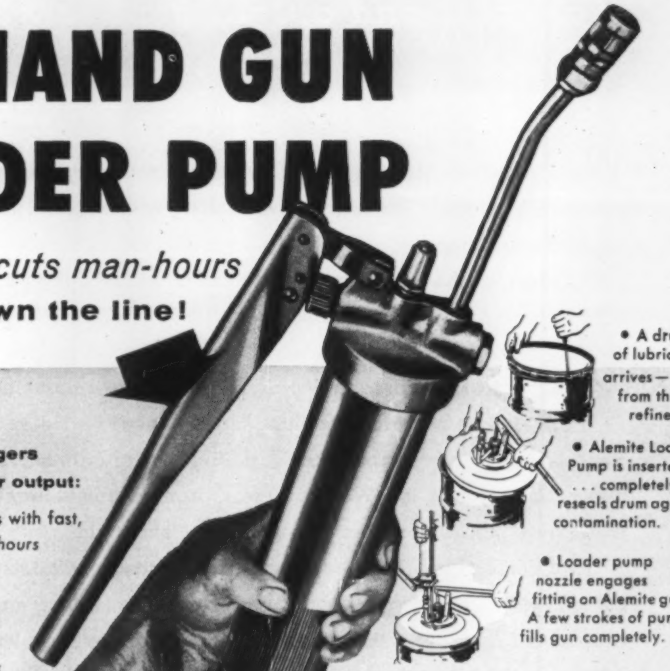
Backward to Forward!



ALEMITE HAND GUN WITH LOADER PUMP

reduces downtime... cuts man-hours

...saves right down the line!



- A drum of lubricant arrives—fresh from the refinery.
- Alemite Loader Pump is inserted . . . completely reseals drum against contamination.
- Loader pump nozzle engages fitting on Alemite gun. A few strokes of pump fills gun completely.
- Now the Alemite Hand Gun is ready to deliver "refinery-fresh" lubricant to any machine!

Why more and more plant managers look to Alemite lubrication for greater output:

Time studies prove it! Refilling hand grease guns with fast, efficient Alemite Loader Pumps saves you *15 man-hours* for every 400-pound drum of lubricant, compared with loading the old-fashioned hand-and-paddle way!

You eliminate the cost, mess and fire hazard of "oil-room" spillage. With Alemite equipment you can *transfer, load and apply* lubricant that you know is *completely* free of dirt, grit or abrasives. Machine-hours are saved, too! With better lubricated bearings, machines stay new longer!

Alemite can furnish a hand gun of correct capacity for your operation—from 8 ounces to 2 pounds. And you get the pressure you need—up to 15,000 pounds! There is an Alemite Loader Pump to fit any standard lubricant container you normally use—stationary models for 100-lb. and 400-lb. drums; portable models for 25-lb. and 35-lb. pails.

Ask your nearest Alemite supplier for full details.

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Please send me my FREE copy of "5 Plans for Better Lubrication."

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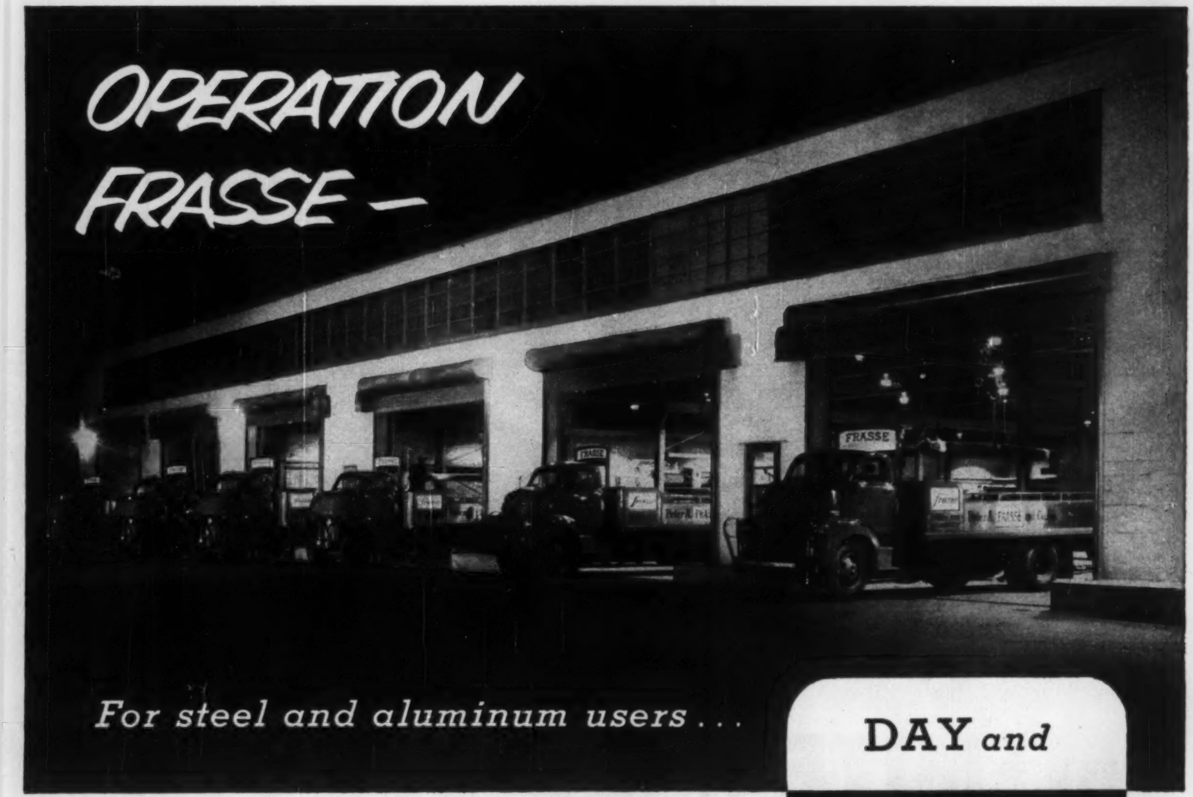

DAY and
NIGHT

While you sleep, loading operations are underway . . . before you awaken modern Frasse trucks are rolling with material you ordered hours ago.

This fast, on-the-ball delivery is typical of the handling your orders receive when you do business with Frasse. Thousands of firms know this service is *routine* . . . and depend on quick, sure delivery from Frasse to keep production lines producing.

Frasse stocks *all* of the popular grades, shapes and sizes of stainless, alloy and carbon steels, tubing and aluminum . . . plus many specials, too. When you work from complete Frasse warehouse stocks you eliminate needless "shopping".

And, remember — Frasse engineers are always available to consult with you on problems involving steels, tubing and aluminum. Their services are free, and they can be consulted anytime — by mail, phone . . . or on the spot in your plant.

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Power on the rails for *every* job!

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SINCE 1914 Plymouth Locomotives have been used for heavy hauling and switching jobs. They have proven themselves in year after year service with rock bottom economy, maximum availability, minimum down time. It takes a locomotive like Plymouth, ruggedly built, with plenty of power, and torqomotive control, to solve your switching and spotting problems efficiently, economically, and for many years to come.

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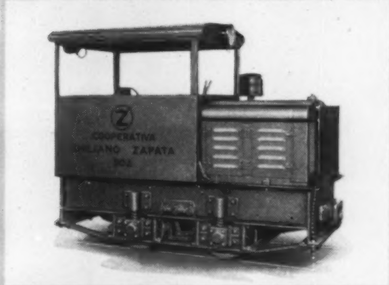
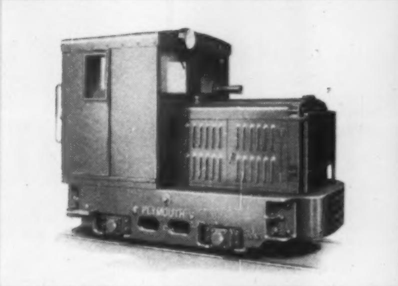
Send brief outline of your operating needs and problems for engineering analysis and new catalogs.

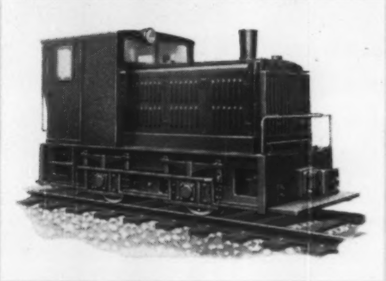
Plymouth Locomotive Works Division of
THE FATE-ROOT-HEATH COMPANY
Dept. A-1, Plymouth, Ohio

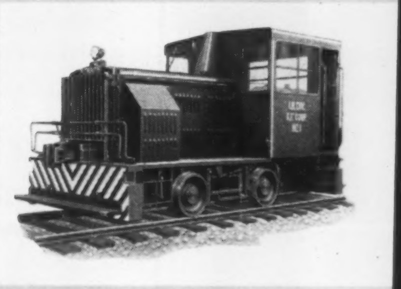
PLYMOUTH® TORQOMOTIVES



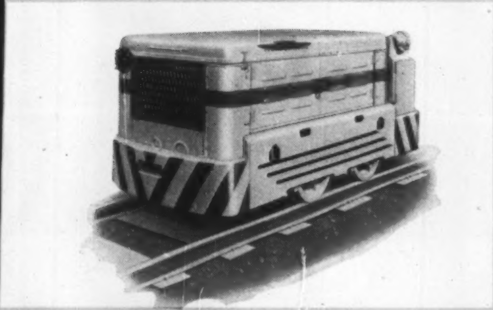


SERIES R&T (left)—3, 3½, 4 Tons, Gasoline or Diesel, Mechanical Drive, Compact for short turns, tight places. **SERIES F** (right)—5, 6 Tons, Gasoline or Diesel, Mechanical or Torqomotive* Drive. Low center of gravity, short wheelbase.



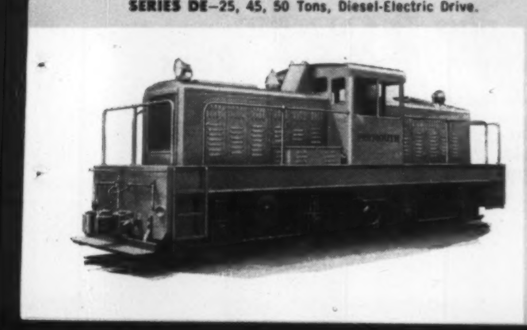


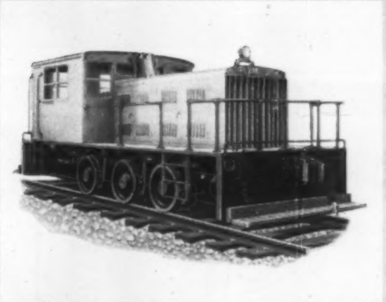
SERIES D (left)—8, 10 Tons, Gasoline or Diesel, Mechanical or Torqomotive Drive, Cast or Welded Frame. **SERIES J** (right)—12, 14, 16, 18, 20 Tons, Gasoline or Diesel, Mechanical or Torqomotive* Drive. 4- or 6-wheel Drive.

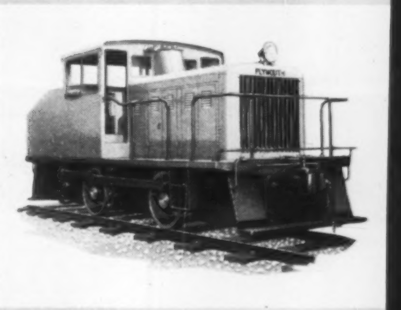


MINE-O-MOTIVE 5, 6, 7, 8, or 10 Tons Torqomotive* Drive. First Diesel-powered locomotive to operate in American coal mines, approved under Schedule #22, U.S. Bureau of Mines.

SERIES DE—25, 45, 50 Tons, Diesel-Electric Drive.







SERIES M & W (left)—25, 30, 35, 40 Tons, Gasoline or Diesel, Mechanical or Torqomotive* Drive, 4- or 6-wheel Drive. **SERIES KC & KH** (right)—45, 50, 65, 70 Tons, Mechanical or Torqomotive* Drive, Diesel only. Heaviest duty, direct drive.

**Torqomotive Drive:* Plymouth transmission coupled to automatic torque-converter.

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more than ever . . .

MORSE

means

"THE MOST"

in Cutting Tools

TUNGSTEN CARBIDE
MORSE
MORSE
MORSE
MORSE
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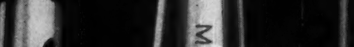
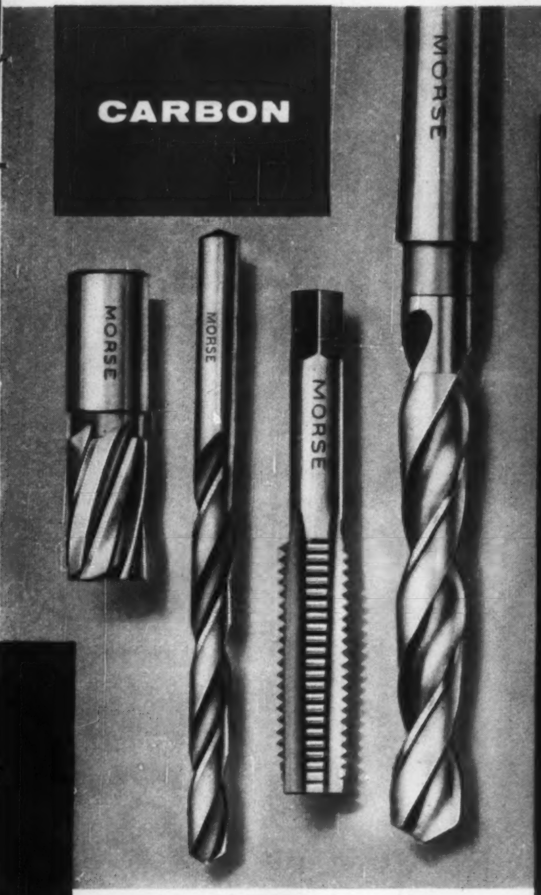
. . . plus MORSE *Electrolized* Tools

On jobs where there's excessive wear and abrasion, Morse Drills, Taps, Reamers, Cutters and End Mills last 2 to 10 times longer than untreated tools. Available only from your Morse-Franchised Distributor.



. . . plus MORSE *"Vectormatic-Ground" Taps*

New, exclusive Morse "Vectormatic" process gives you taps with "locked-in precision" . . . with tolerances held nearly 300% closer than with old thread-grinding methods. Available only from your Morse-Franchised Distributor.



HIGH SPEED
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Now Morse gives you everything from carbon to carbide . . . the most complete cutting tool line in industry today. *And the one man who has this complete line is your Morse-Franchised Distributor.*

This means that all your needs can be covered by one order . . . one invoice . . . backed up by Morse engineering service. And it also means that your Morse-Franchised Distributor can freely recommend the best cutting tool for every job in your plant . . . *regardless of tool requirement.* So see him *now* for all the cutting tools you need, including the new Morse Tungsten Carbide line, tipped or solid.

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CUTTING TOOLS

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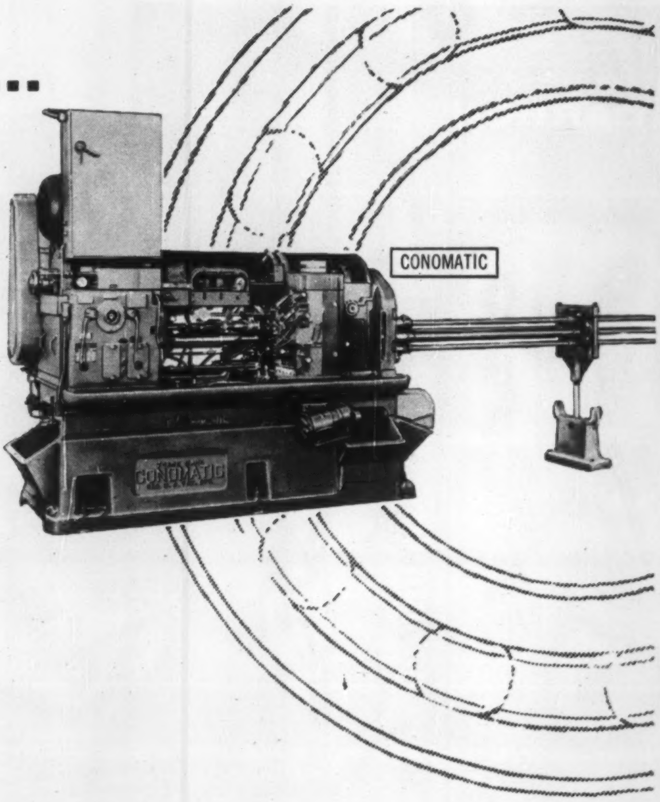
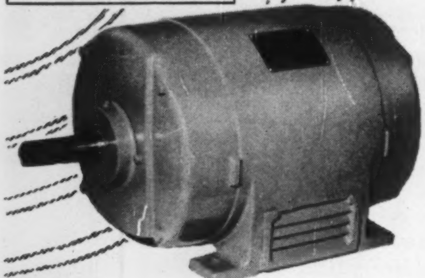
to feed a tool...

Automatic feed transmissions on newest type Conomatic Six Spindle Bar Machines have to deliver a powerful, steady tool drive under heavy loads for precision carbide machining. Feed shaft bearings must be rugged—precise. They're Federal Ball Bearings.





or quiet a motor...

The smooth hum of today's precision-built motors whispers the efficiency of every part. Here, too, Federal Ball Bearings quietly perform their continuous, anti-friction assignment—whatever the size—whatever the type.

so much of industry *turns* on FEDERAL ball bearings

Machine tools—motors—or moving vans! At plant, home, machine shop! On the highway, on the farm—where there's anti-friction work to be done, you'll find Federal Ball Bearings quietly and efficiently on the job. Hundreds of types—12,000 sizes—produced by this 50-year-old manufacturer of ball bearings...exclusively.
When Federal Ball Bearings are a part of so many things you *use*, shouldn't they be a part of the things you *make?*

Just off the presses! *175 pages of ball bearing and engineering data* —FEDERAL'S NEW CATALOG! *Just drop us a line and we'll speed you your copy.*

THE FEDERAL BEARINGS CO., INC. • POUGHKEEPSIE, N. Y.

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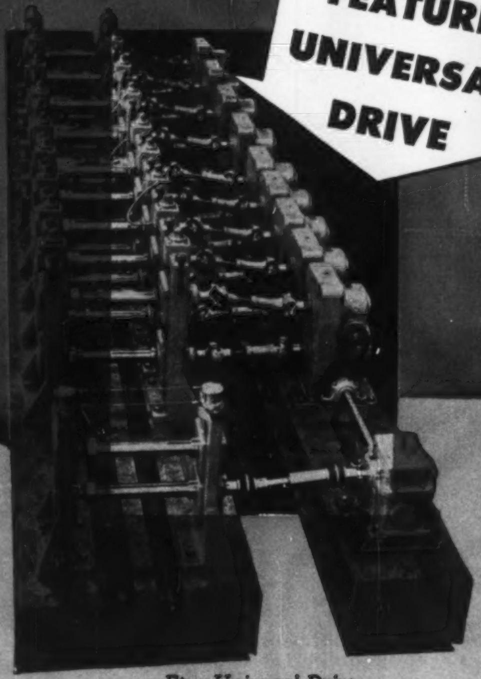
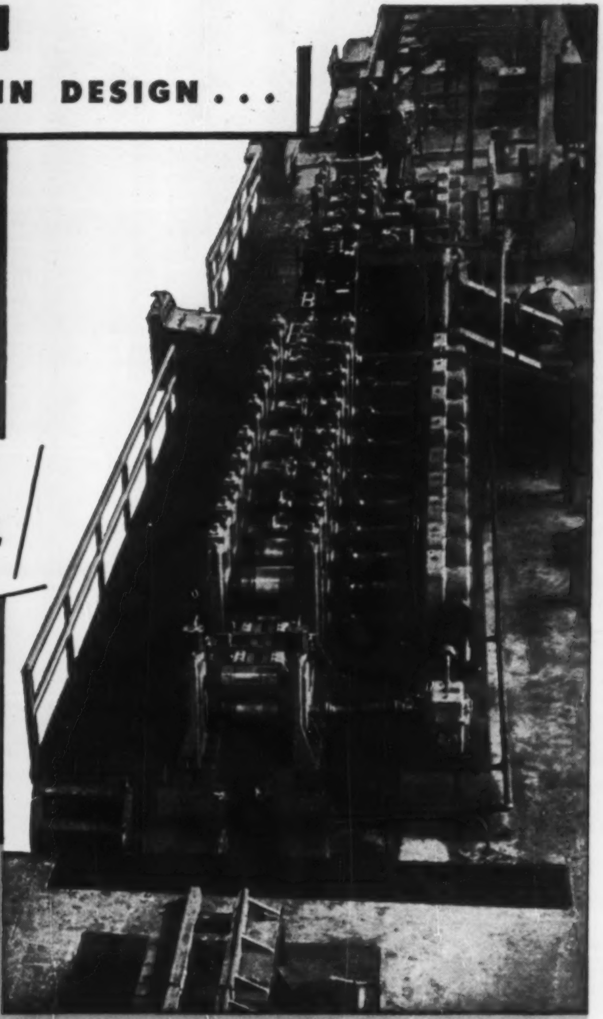
Etna
TUBE MILLS

FEATURE
UNIVERSAL
DRIVE



Etna Universal Drive

You'll notice a trend toward Etna's modern machine design. Etna has sold more Universal Drive Mills than all other manufacturers combined. The Universal Drive provides greater accuracy in the forming of the tube, and allows an easier change from the manufacture of one diameter tube to another.



PERMANENT OIL COOLED TRANSFORMER

For greater efficiency an *Oil Cooled Transformer* is incorporated into the machine. It is a *permanent unit* and *never has to be replaced*. Cooling with oil eliminates the necessity to dry out the transformer after each days work, which is necessary when water is used as a transformer coolant. Etna Mills . . . Built for continuous operation. Write for complete details.

Abbey ETNA Company
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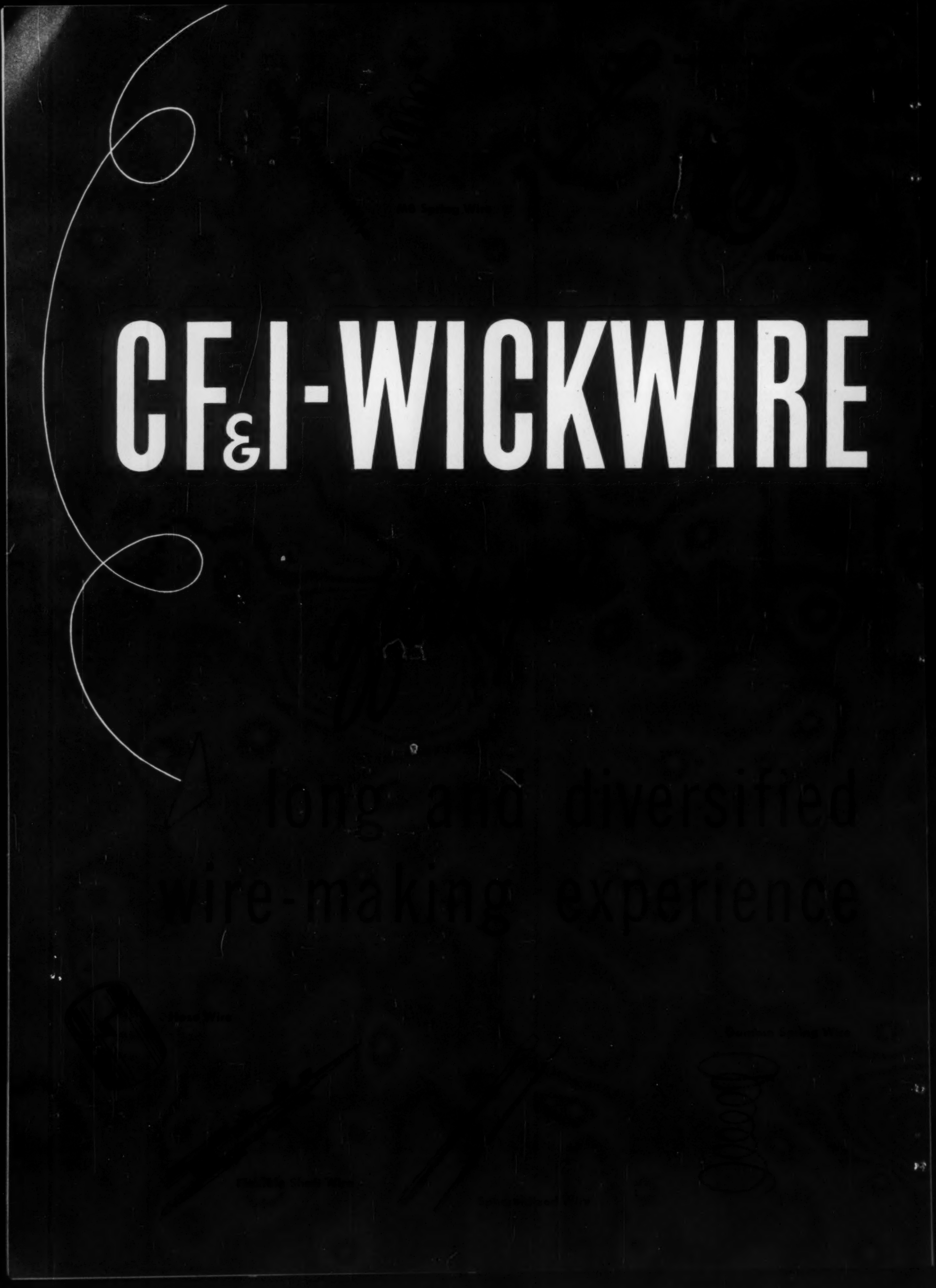
CF&I-WICKWIRE
long and diversified
wire-making experience
MB Spring Wire
Hose Wire
Welding Chain Wire
Spring Wire

Stapling Wire
Rope Wire
Clip Wire

Every time you use CF&I-Wickwire Wire, you reap the benefit of over [illegible] wire-making experience [illegible] that the proper character [illegible] to meet the needs for which it is [illegible]

[illegible] CF&I-WICKWIRE [illegible] drawing wire [illegible] has been steadily diversified. As a result, today's CF&I organization offers one of the most complete lines of wire available anywhere. Just check the partial list shown below.

Ask the CF&I-WICKWIRE representative to visit you for complete details on how you can take full advantage of our long and diversified experience. No obligation on your part, of course.

CF&I-WICKWIRE WIRE

[illegible]

other wires made by C F & I-WICKWIRE include:

flat and shaped wires
- Armor Wire (Half Oval)
- Bookbinder Wire
- Brush Wire, Tempered Flat (Gutter Broom Wire)
- Casing Wire
- Cotter Pin Wire
- Curtain Spring Wire
- Die Spring Wire
- Lock Spring Steel
- Rake Tine Steel
- Regulator Spring Wire
- Snake Fishing Steel

fine and specialty wires
- Aircraft Cord Wire
- Armature Binding Wire
- Bee Wire
- Belt Hook Wire
- Bonnet Wire
- Bookbinder Wire
- Broom Wire
- Brush Wire (High Strain)
- Curtain Spring Wire
- Dent Spacer Wire
- Drapery Pin Wire
- Florist Wire
- Fuse Wire
- Glass Netting Wire
- Hairpin Wire
- Hook and Eye Wire
- Hose Reinforcement Wire
- Mattress Wire
- Picker Tooth Wire
- Pin Ticket Wire
- Pin Wire
- Spiral Binding Wire
- Stone Wire
- Weaving Wire
- Wissco Iron Wire

manufacturers' wire
- Armor Wire
- Box Binding Wire
- Brush Handle Wire
- Can Key Wire
- Case Hardened Ball Wire
- Chain Wire
- Clamp Wire
- Clothes Pin Wire
- Concrete Wall Reinforcement Wire
- Garment Hanger Wire
- Hay Baling Wire
- Merchant Quality Wire
- Strand Wire
- Tying Wire

high carbon steel wire
- Bobbin Ring Wire
- Chrome Vanadium Spring Wire
- Core Wire (Aluminum Cable Steel Reinforced)
- Hat Wire
- Spoke Wire
- Tire Bead Wire
- Valve Spring Wire

FOR THE WIRE YOU REQUIRE—CHECK CF&I-WICKWIRE

3565

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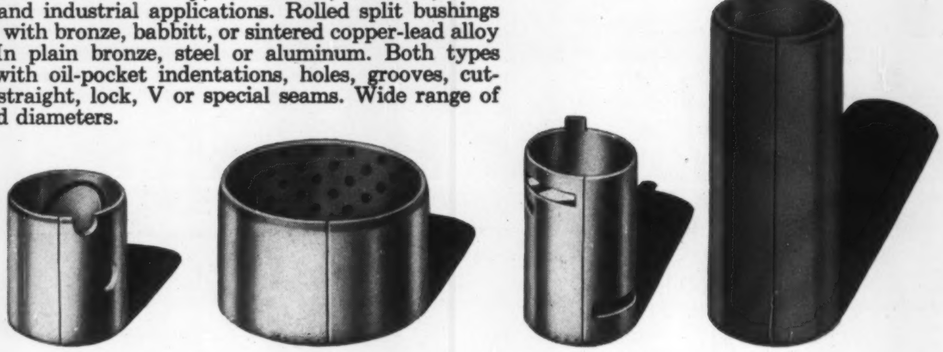
widely used in farm machinery, automotive, electrical, home appliance and industrial applications. Rolled split bushings in Bimetal with bronze, babbitt, or sintered copper-lead alloy on steel. In plain bronze, steel or aluminum. Both types available with oil-pocket indentations, holes, grooves, cut-outs, and straight, lock, V or special seams. Wide range of lengths and diameters.



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for automatic transmissions and similar applications. In bronze and Bimetal, made to your special requirements. Note the variety of design features possible. Bimetal types include steel-backed, faced with bronze or copper-lead alloy. Our special sintering process permits facing one or both sides with copper-lead.

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sleeves, bushings or ferrules. Thousands of uses from cars to phonographs. Rolled split type in steel, from ¼″ to 3″ O.D. Economical replacement for tubing or machined parts. No cut-off, de-burring or scrap. Ready to assemble. Send for catalog of 645 standard sizes and prices.

Here are exceptional facilities and equipment for low-cost quantity production of your requirements. Complete engineering service.

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You can now get ANY TYPE FILE YOU NEED from one complete line — SIMONDS! The famous "RED TANG" Line now includes ALL TYPES OF FILES for every purpose: machine shop, saw filing, die making, precision craftsmen, automotive, aircraft, pattern makers, foundries, railroad and shipyards, garages and for special applications.

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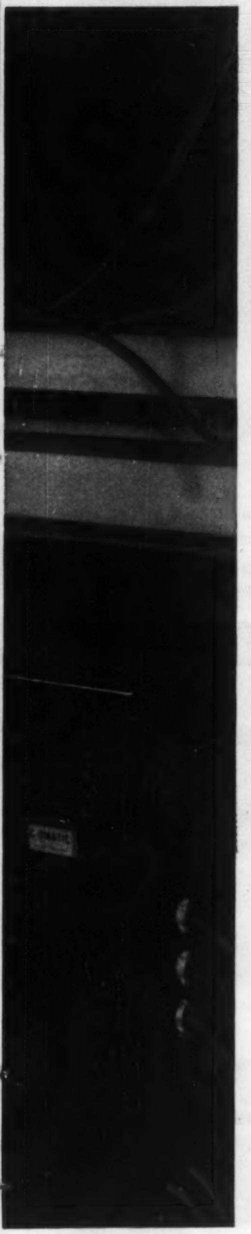
C-OMATIC

NOW! Weld even mild and

A.O.Smith
WELDING PRODUCTS
A.O.Smith D.C. WELDER

developed by A. O. Smith

medium carbon steels automatically... new gas-shielded metal arc process uses Carbon Dioxide to shield the arc



ON GAS ALONE **in one year's time (3 shifts per day, 260 days), a single C-OMATIC unit saves you *$14,902.00 over Argon, $15,367.00 over Helium.***

- **NEW ECONOMY** thanks to use of less-costly Carbon Dioxide . . . thanks to low maintenance requirements of functional design.
- **X-RAY QUALITY WELDS** — Strength and ductility — yours with C-OMATIC.
- **VISIBLE ARC** means faster, easier welding . . . quick, convenient spotting of nozzle. (When required, C-OMATIC is easily convertible to submerged arc, too.)
- **DEEP PENETRATION** further assures high quality welds. No slag to remove . . . no flux to clean up.
- **ACCURATE CONTROL SYSTEM** of constant current design maintains preset arc voltage without fluctuation. No complex electronic circuits! Auxiliary controls available.
- **POWER SOURCE** — The service-proved A. O. Smith d-c rectifier.

Chart illustrates astonishing savings

	HELIUM	C-OMATIC	YOUR SAVINGS		ARGON	C-OMATIC	YOUR SAVINGS
Gas consumption per hour	70 cu. ft.	30 cu. ft.	40 cu. ft.	Gas consumption per hour	60 cu. ft.	30 cu. ft.	30 cu. ft.
Cost of gas per cu. ft.	$0.067	$0.01	$0.057	Cost of gas per cu. ft.	$0.09	$0.01	$0.08
Cost of gas per hour	$4.69	$0.30	$4.39	Cost of gas per hour	$5.40	$0.30	$5.10
Cost per hour 60% of duty cycle	$2.81	$0.18	$2.63	Cost per hour 50% of duty cycle	$2.70	$0.15	$2.55
Cost per day (3 shifts, 22.5 hours)	$63.20	$4.05	$59.15	Cost per day (3 shifts, 22.5 hours)	$60.80	$3.38	$57.42
Cost per year (260 days)	$16,420	$1,053	$15,367	Cost per year (260 days)	$15,780	$878	$14,902

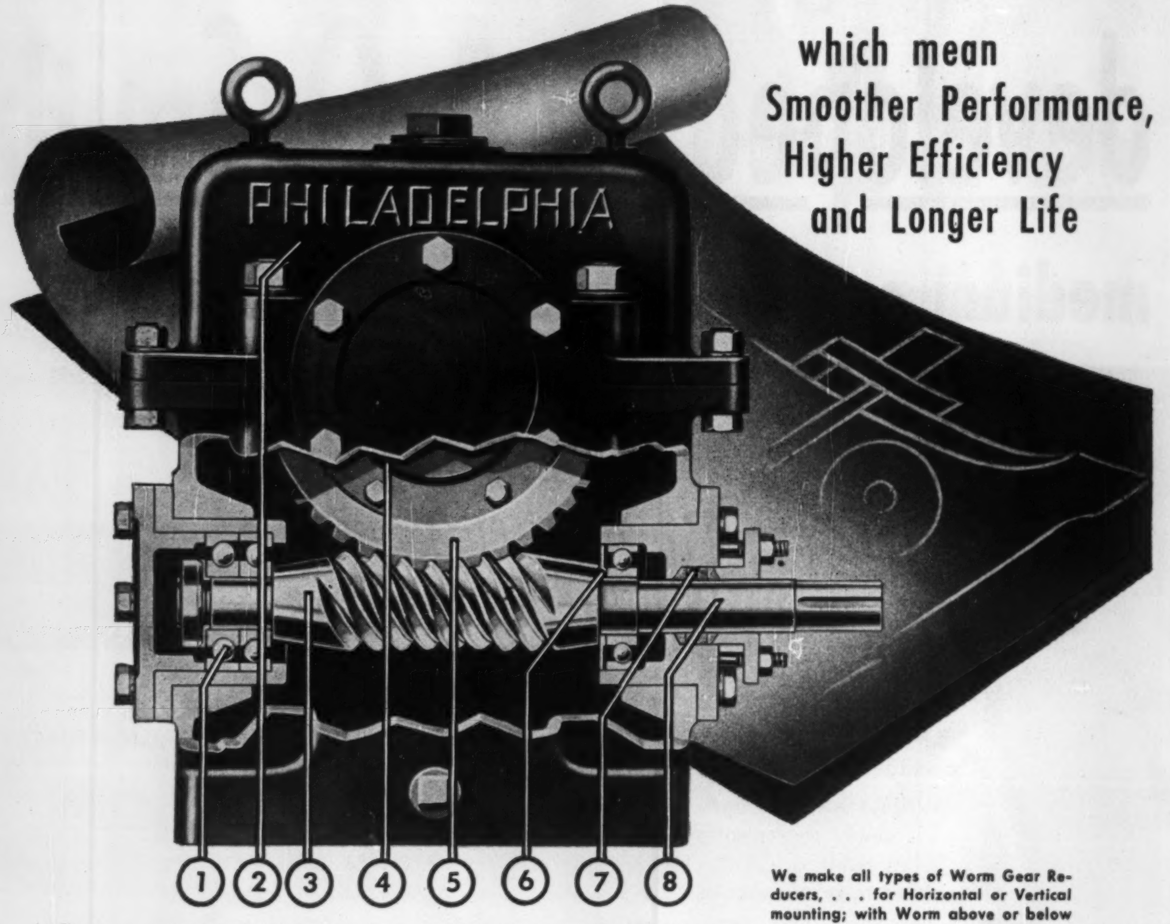
GET ALL THE FACTS NOW! Write for free booklet describing C-OMATIC in detail. Welding Products Division, A. O. Smith Corporation, Milwaukee 1, Wisconsin.

Through research . . . a better way

A.O.Smith
CORPORATION
WELDING PRODUCTS DIVISION
Milwaukee 1, Wisconsin
INTERNATIONAL DIVISION: MILWAUKEE 1, WIS.

YOU GET ALL THESE ADVANTAGES...

which mean Smoother Performance, Higher Efficiency and Longer Life



1. BEARINGS throughout are of highest quality, calculated to take all loads and stresses in accordance with maximum ratings of units.

2. EXCEPTIONALLY RIGID HOUSING of best grade cast iron . . . Strengthening ribs integral with design.

3. WORMS made of SAE 3115 Steel with carburized and hardened threads. Shaft and threads smoothly ground after hardening.

4. GEAR SHAFT BEARINGS run in an oil well that automatically fills with fresh oil when filled from top. Splash from the gear keeps the wells filled to the overflow point.

5. WORM GEAR made from quality chill cast nickel bronze bolted to a semi-steel center. (Smaller sizes are solid bronze.)

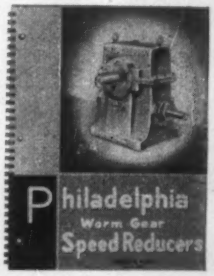
6. WORM AND WORM BEARINGS run in oil bath. Baffle plates prevent flooding.

7. WORM SHAFT equipped with stuffing box to prevent oil leakage.

8. SHAFTS are premium quality. Always accurate, straight, concentric.

We make all types of Worm Gear Reducers, . . . for Horizontal or Vertical mounting; with Worm above or below Worm Gear; in Single, Double or Triple Reductions for medium or heavy duty service; any horsepower or reduction ratio.

Tell us your Speed Reduction problems, and a Philadelphia Sales Engineer will gladly call upon you, . . . without obligation.


Philadelphia
Worm Gear
Speed Reducers

Catalog WG-51 sent upon request on your letterhead.

PHILADELPHIA GEAR WORKS, INC.

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NEW YORK • PITTSBURGH • CHICAGO • HOUSTON • LYNCHBURG, VA.
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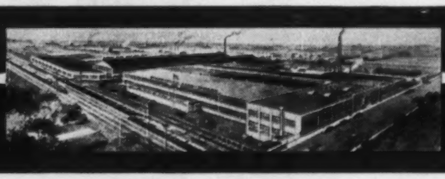
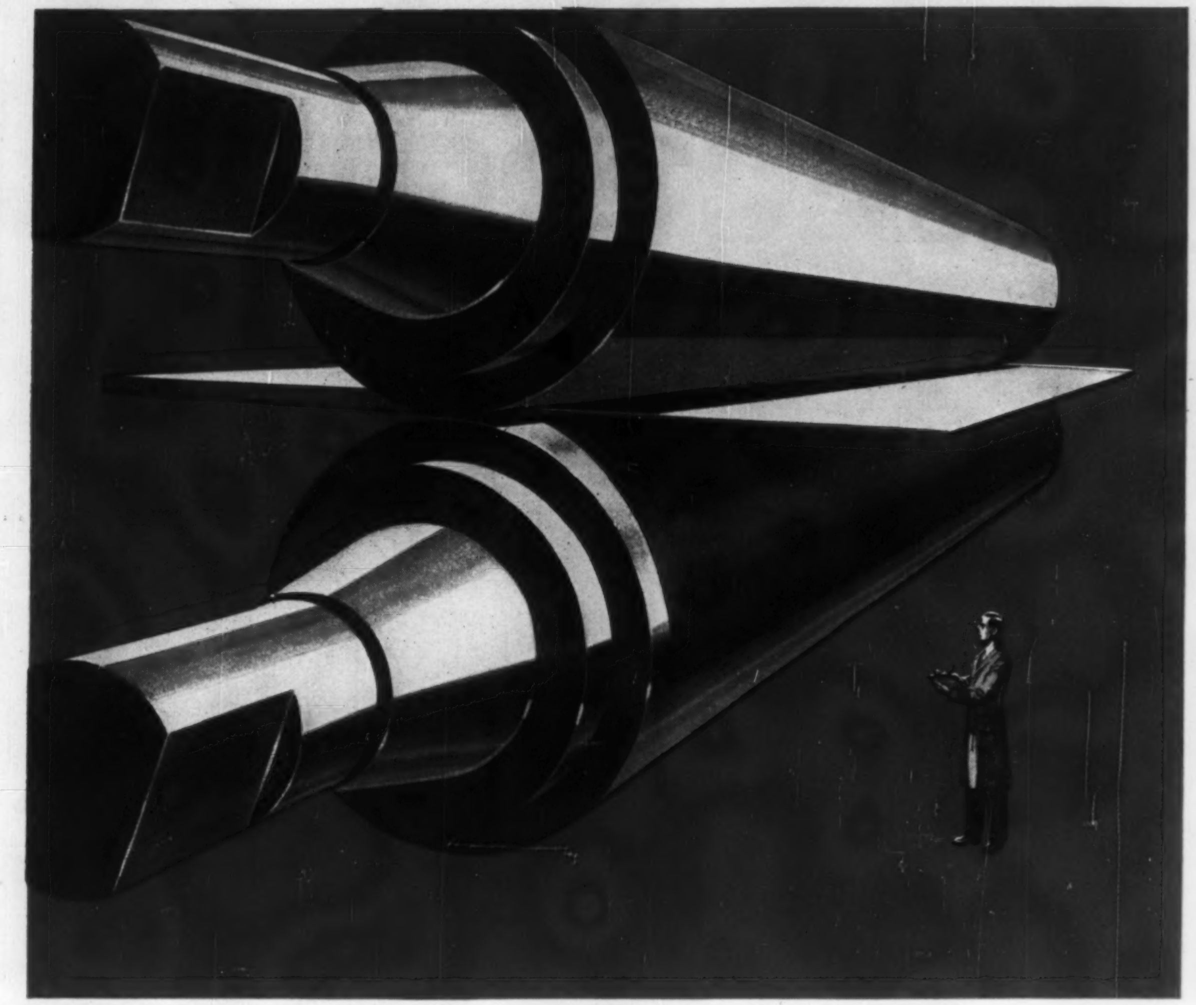


Industrial Gears & Speed Reducers

LimiTorque Valve Controls

Established 1892



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Here's a man with experience, where experience counts, on-the-job experience in heavy industrial lubrication.

He's a man who is typical of Atlantic service. Selected to represent Atlantic because he *is* a specialist. And he's backed by other Atlantic specialists in lubrication research, production, quality control and transportation.

Atlantic has served customers successfully for 85 years because Atlantic has developed the products necessary to do the lubrication job right at the lowest cost to the lubricant consumer.

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ATLANTIC

LUBRICANTS · WAXES
PROCESS PRODUCTS

ELECTROMET

TRADE-MARK

BORON ALLOYS

Ferroboron Min. 10.00% Boron Grade	Aluminum ...max. 0.50% Carbon .....max. 1.50%
Min. 17.50% Boron Grade	Aluminum ...max. 0.50% Carbon .....max. 0.50%
Manganese-Boron	Boron .....min. 17.50% Manganese ..approx. 75% Carbon ....max. 3% Iron ....max. 5%

CALCIUM ALLOYS

Calcium-Silicon	Calcium ......30 to 33% Silicon ....60 to 65% Iron ....1.50 to 3%
Calcium-Manganese-Silicon	Calcium ......16 to 20% Manganese ...14 to 18% Silicon ......53 to 59%
Calcium Metal Regular Grade	Calcium ....99% Balance largely Magnesium and Aluminum
Distilled Grade	Calcium..approx. 99.50% Balance largely Magnesium

CHROMIUM ALLOYS

"Simplex" Low-Carbon Ferrochrome No. 1	Chromium ....63 to 66% Silicon ....5 to 7% Carbon ....max. 0.010% or 0.025%
2% Nitrogen-Bearing Grade	Chromium ....62 to 65% Silicon ....5 to 7% Nitrogen ......2 to 2.5% Carbon ....max. 0.025%
5% Nitrogen-Bearing Grade	Chromium ....60 to 63% Silicon ....5 to 7% Nitrogen ......5 to 6% Carbon ....max. 0.025%
"Simplex" Low-Carbon Ferrochrome No. 2	Chromium ....63 to 66% Silicon .....max. 1.00% Carbon ....max. 0.025%
2% Nitrogen-Bearing Grade	Chromium ....62 to 65% Silicon .....max. 1.00% Nitrogen .....2 to 2.5% Carbon ....max. 0.025%
5% Nitrogen-Bearing Grade	Chromium ....60 to 63% Silicon .....max. 1.00% Nitrogen ......5 to 6% Carbon ....max. 0.025%
Low-Carbon Ferrochrome (Other Grades)	Chromium ....67 to 71% Silicon ...0.30 to 1.00% Carbon (10 Grades) max. 0.02 to max. 2.00%

CHROMIUM ALLOYS cont.

High-Carbon Ferrochrome Medium Carbon Grade	Chromium ....66 to 70% Silicon ....max. 2% Carbon ...2.25 to 3.00% Sulphur .....max. 0.03%
Max. 4.50, 5.00, or 6.00% Carbon Grade	Chromium ....67 to 70% Silicon ....1 to 2%
Max. 7.00% Carbon Grade	Chromium ....66 to 69% Silicon ....1 to 3%
Min. 7.00% Carbon Grade	Chromium ....65 to 68% Silicon ....1 to 3%
Low-Chromium Grade	Chromium ....57 to 64% Carbon ......3.5 to 5% Silicon ....2 to 4.5%
Nitrogen-Bearing Low-Carbon Ferrochrome	Chromium ....65 to 70% Silicon ...0.30 to 1.00% Carbon .....max. 0.10% Nitrogen ..0.75 to 2.00%
"SM" Ferrochrome	Chromium ....60 to 65% Silicon ....4 to 6% Carbon ....4 to 6% Manganese ....4 to 6%
"EM" Ferrochrome-Silicon	Chromium ....39 to 41% Silicon ......42 to 45% Carbon ......max. 0.05%
"EM" Ferrosilicon-Chrome	Chromium ....50 to 54% Silicon ....28 to 32% Carbon ......max. 1.25%
Exothermic Ferrochrome 5	Chromium ..approx. 50% Carbon ....approx. 2.5%
Exothermic Ferrochrome 8	Chromium ..approx. 48% Carbon .....approx. 4%
Exothermic Silicon-Chrome	Chromium ..approx. 44% Silicon .....approx. 22% Carbon .....max. 1.00%
Foundry Ferrochrome	Chromium ....62 to 66% Silicon ....7 to 10% Carbon ....5 to 7%
Foundry Ferrosilicon-Chrome	Chromium ....50 to 54% Silicon ....28 to 32% Carbon .....max. 1.25%
Chromium Metal High-Carbon Grade	Chromium ....88 to 91% Carbon ....9 to 11% Iron ....max. 0.75%
Electrolytic Grades Laboratory Grade	Chromium ..min. 99.85% Iron ....max. 0.03%
Commercial Grade	Chromium ..min. 99.80% Iron ....max. 0.20%
"EM" Chromium Briquets (Hexagonal Shape)	Chromium ....2 lb. Total Weight .....3⅜ lb.

COLUMBIUM ALLOYS

Ferrocolumbium	Columbium ...50 to 60% Silicon ....max. 8% Carbon .....max. 0.40%
Ferrotantalum-Columbium	Columbium ..approx. 40% Tantalum ...approx. 20% Cb+Ta ....min. 60% Carbon .....max. 0.30% Iron ......approx. 25%

MANGANESE ALLOYS

Standard Ferromanganese Regular Grade	Manganese ...74 to 76% Carbon ......approx. 7% Silicon ....max. 1%
Low-Phosphorus Grade	Manganese ...78 to 80% Carbon ....max. 7% Silicon ....max. 2% Phosphorus ..max. 0.10%
Low-Carbon Ferromanganese Low-Phosphorus Grade	Manganese ....min. 90% Carbon .....max. 0.07% Phosphorus ..max. 0.06%
Regular Grades	Manganese ...85 to 90% Carbon ..max. 0.07, 0.10, 0.15, 0.30 or 0.50%
Regular Grade (High-Silicon)	Manganese ...80 to 85% Carbon .....max. 0.75% Silicon ....5 to 7%
"Mansiloy" Alloy	Manganese ...60 to 63% Silicon ......28 to 31% Carbon .....max. 0.07% Phosphorus ..max. 0.05%
Silicomanganese Max. 1.50% Carbon Grade	Manganese ...65 to 68% Silicon ....18 to 20%
Max. 2.00% Carbon Grade	Manganese ...65 to 68% Silicon ....15 to 17.50%
Max. 3.00% Carbon Grade	Manganese ...65 to 68% Silicon ....12 to 14.50%
Low-Iron Ferromanganese	Manganese ...85 to 90% Carbon ...approx. 7.00% Silicon ....max. 3% Iron ....max. 2%
Medium-Carbon Ferromanganese	Manganese ...80 to 85% Carbon ...1.25 to 1.50% Silicon.max. 1.00 or 1.50%
Nitrogen-Bearing Grade	Manganese ...78 to 81% Carbon ...1.15 to 1.50% Silicon .....max. 1.50% Nitrogen ..approx. 4.50%

IF YOU HAVE A METALS PROBLEM

More than 50 different alloys and metals are produced by ELECTROMET. If you need help in selecting the proper alloys, be sure to consult one of ELECTROMET's specially trained metallurgists and engineers. Address your inquiries to one of the offices listed at right.

Birmingham 2, Ala............2900 Cahaba Road
Chicago 1, Ill............230 N. Michigan Avenue
Cleveland 14, Ohio.........1300 Lakeside Avenue
Detroit 21, Mich......10421 West Seven Mile Road
Houston 11, Texas......6119 Harrisburg Boulevard
Los Angeles 58, Calif.........2770 Leonis Boulevard
New York 17, N.Y............30 East 42nd Street
Pittsburgh 22, Pa................Oliver Building
San Francisco 6, Calif.............22 Battery Street
In Canada: Electro Metallurgical Company, Division of Union Carbide Canada Limited, Welland, Ontario

ALLOYS FOR THE STEEL, IRON, AND NON-FERROUS INDUSTRIES

MANGANESE ALLOYS cont.

Manganese Metal Electrolytic Grade	Manganese .min. 99.90%
Nitrogen-Bearing Electrolytic Grade	Manganese ..approx. 93% Nitrogen ....approx. 6%
"EM" Silico-manganese Briquets (Square Shape)	Manganese ....2 lb. Silicon ....½ lb. Total Weight .....3½ lb.
"EM" Ferro-manganese Briquets (Oblong Shape)	Manganese ....2 lb. Total Weight ....3 lb.

SILICON ALLOYS

50% Ferrosilicon Regular Grade	Silicon ....47 to 51%
Blocking Grade	Silicon ......47 to 51%
Boron-Bearing Grade	Silicon ......47 to 51% Boron ....0.04 to 0.05% Or higher if desired
Low-Aluminum Grade	Silicon ......47 to 51% Aluminum ...max. 0.40% or 0.10%
Ferroaluminum-Silicon	Silicon .....approx. 50% Aluminum ..approx. 10%
65% Ferrosilicon Regular Grade	Silicon ..64.50 to 69.50%
Low-Impurity Grade	Silicon ...... 62 to 68% Aluminum .. max. 0.10% Total Impurities max. 0.85%
75% Ferrosilicon Regular Grade	Silicon ....73 to 78%
Low-Aluminum Grade	Silicon ....73 to 78% Aluminum ...max. 0.50%
85% Ferrosilicon Regular Grade	Silicon ....83 to 88%
Calcium-Bearing Grade	Silicon ......83 to 88% Calcium ....min. 0.50%
Low-Aluminum Grade	Silicon ....83 to 88% Aluminum ...max. 0.50%
90% Ferrosilicon Regular Grade	Silicon ....92 to 95%
Low-Aluminum Grade	Silicon ....92 to 95% Aluminum ...max. 0.50%

SILICON ALLOYS cont.

Silicon Metal Regular Grade	Silicon min. 98 or 96.50% Iron..max. 0.75 or 1.50% Calcium ....max. 0.07%
Purified Grade	Silicon ..99.70 to 99.90% Iron ......005 to .015%
Low-Calcium Grade	Silicon ....min. 98% Iron ....max. 0.75% Calcium ....max. 0.03%
Low-Aluminum Grade	Silicon .....min. 98.50% Iron ....max. 0.75% Aluminum ...max. 0.10% Calcium ....max. 0.03%
"EM" Silicon Briquets Large Size (Cylindrical or Brick-Shape)	Silicon ....2 lb. Total Weight ......5 lb.
Small Size (Cylindrical Shape)	Silicon ....1 lb. Total Weight .....2½ lb.
"SMZ" Alloy	Silicon ....60 to 65% Manganese ....5 to 7% Zirconium .....5 to 7%
Magnesium-Ferrosilicon Regular Grade	Silicon ....43 to 47% Magnesium ..7.5 to 9.5%
Cerium-Bearing Grades	Cerium ...0.45 to 0.60% or .....1.80 to 2.20%

TITANIUM ALLOYS

Ferrotitanium	Titanium ..27 to 32%, 50 to 55%, or 68 to 72% Carbon .....max. 0.10%
Silicon-Titanium	Titanium .....40 to 50% Silicon ....45 to 50% Iron ....max. 3%
Manganese-Nickel-Titanium	Titanium 46.50 to 48.50% Nickel ....29 to 31% Manganese ... 6 to 8%

TUNGSTEN ALLOYS

Ferrotungsten	Conforming to A.S.T.M. Spec. A 144-50
Tungsten Metal Powder Melting Grade	Tungsten ...min. 98.80% Total Carbon..max. 0.25%

TUNGSTEN ALLOYS cont.

Calcium Tungstate	Tungstic Oxide.68 to 72%
Calcium Tungstate Nuggets	Tungstic Oxide.68 to 72%
Ammonium Paratungstate	Tungstic Oxide.min. 88.7%

VANADIUM ALLOYS

Aluminum-Vanadium	Vanadium ....80 to 85% Aluminum ....13 to 16% Iron ....max. 1% Silicon ....max. 1% Oxygen .....max. 0.25%
Ferrovanadium	Vanadium ....50 to 55% or 70 to 75% Carbon ..max. 0.20, 0.50, or 3.00% Silicon ..max. 1.50, 2.00, or 8%; and approx. 10%
Vanadium Oxide Fused	V_2O_5 ....86 to 89% Na_2O ....approx. 10% CaO ....approx. 2%
Sodium Polyvanadate (Red Cake)	V_2O_5 ....approx. 85% Na_2O ....approx. 9%
High-Purity	V_2O_5 ....approx. 99.50%
Ammonium Metavanadate	NH_4VO_3 ....min. 99%

ZIRCONIUM ALLOYS

12 to 15% Zirconium Alloy	Zirconium ....12 to 15% Silicon ....39 to 43% Carbon .....max. 0.20%
35 to 40% Zirconium Alloy	Zirconium ....35 to 40% Silicon ......47 to 52% Carbon .....max. 0.50%
"EM" Zirconium Briquets (Cylindrical Shape, Reddish Color)	Zirconium ....0.55 lb. Silicon ....1.90 lb. Total Weight ....5 lb.

"Electromet," "EM," "Mansiloy," "Simplex," "SM," and "SMZ," are trade-marks of Union Carbide and Carbon Corporation.

All of the alloys and metals listed are produced in the usual lump, crushed, or ground sizes, except where other special forms are indicated.

Electro Metallurgical Company

A Division of Union Carbide and Carbon Corporation
30 East 42nd Street UCC New York 17, N.Y.

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● Look under "The Youngstown Sheet and Tube Company" in one of these alphabetical or classified phone books.

They represent the 28 conveniently located district sales offices Youngstown maintains across the country. Offices staffed by men who know the steel business. Men who know and understand your steel problems. Men who are qualified to help you get the specific steel you need.

When you want answers to steel problems in a hurry, just call the Youngstown office nearest to you.

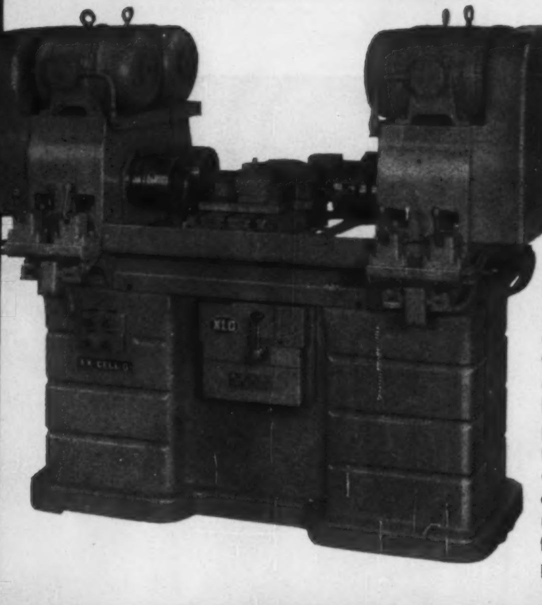
QUALITY YOUNGSTOWN SERVICE

THE YOUNGSTOWN SHEET AND TUBE COMPANY *Manufacturers of Carbon, Alloy and Yoloy Steel*

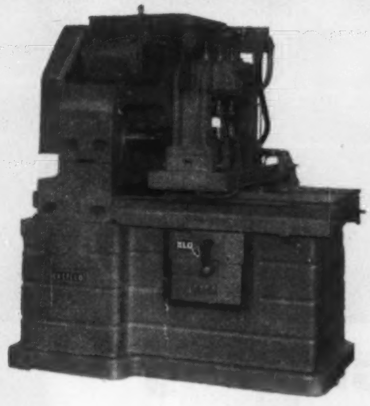
General Offices Youngstown, Ohio District Sales Offices in Principal Cities.

SHEETS - STRIP - PLATES - STANDARD PIPE - LINE PIPE - OIL COUNTRY TUBULAR GOODS - CONDUIT AND EMT - MECHANICAL TUBING - COLD FINISHED BARS - HOT ROLLED BARS - WIRE - HOT ROLLED RODS - COKE TIN PLATE - ELECTROLYTIC TIN PLATE - BLACK PLATE - RAILROAD TRACK SPIKES - MINE ROOF BOLTS

STYLE 2112-B. Single-end model for work pieces in the small and medium-size range. Flexible hydraulic controls give easy adjustment of multiple operations.



STYLE 1212-B. For identical or different operations at each end. When loading time of parts approximates the time of machining, a double-end machine practically doubles production.



STYLE 112-D. Large and sturdy with long stroke. Accommodates medium and heavy work, gives maximum precision production, minimum operating cost.

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Ex-Cell-O Precision Boring Machines

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You can precision-bore, turn, face, counterbore, chamfer, or groove with these fast, sturdy, flexible EX-CELL-O machines.

These are standard machines that handle many kinds of precision operations. EX-CELL-O has the *standard items of tooling* to make this possible at minimum cost.

Any EX-CELL-O Precision Boring Machine will give you *precision work at maximum production* speeds, with a minimum of investment.

Get all the facts about them from your local Ex-Cell-O representative, or write for a Precision Boring Catalog.

EX-CELL-O CORPORATION
DETROIT 32, MICHIGAN

MANUFACTURERS OF PRECISION MACHINE TOOLS • GRINDING SPINDLES
CUTTING TOOLS • RAILROAD PINS AND BUSHINGS • DRILL JIG BUSHINGS
AIRCRAFT AND MISCELLANEOUS PRODUCTION PARTS • DAIRY EQUIPMENT

55-51

High Speed Production Grinding **DEMANDS** more than just a Coolant!

High speed production grinding has made just *coolants* obsolete! Today's water-mix grinding fluid must provide lubrication, heat dissipation qualities, anti-rust protection and balanced surface tension. If you're using "*just a coolant,*" it's costing you extra money!

Stuart's CODOL is a carefully designed liquid grinding compound that is *far more than just a coolant*. CODOL has been scientifically compounded to provide far more detergency than ordinary water-mix grinding fluids. Wheel loading is greatly reduced and allows more pieces to be ground per wheel dressing.

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To be sure that you consider *all* of the important points, such as ease of mixing, resistance to rancidity, gumming and foaming, when selecting a water-mix grinding fluid, ask "the Man in the Barrel," your Stuart Representative, to call and help you. And write today for your copy of the Stuart Water-Mix Cutting and Grinding Fluid book.

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Stuart Oils

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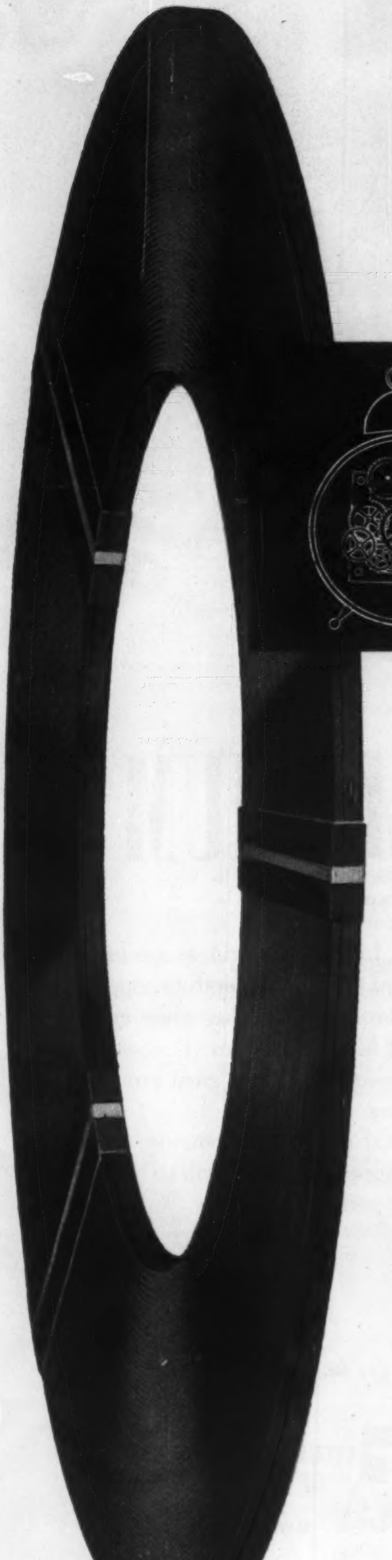
Time Tested Cutting Fluids and Lubricants



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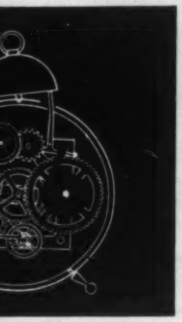

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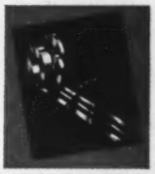

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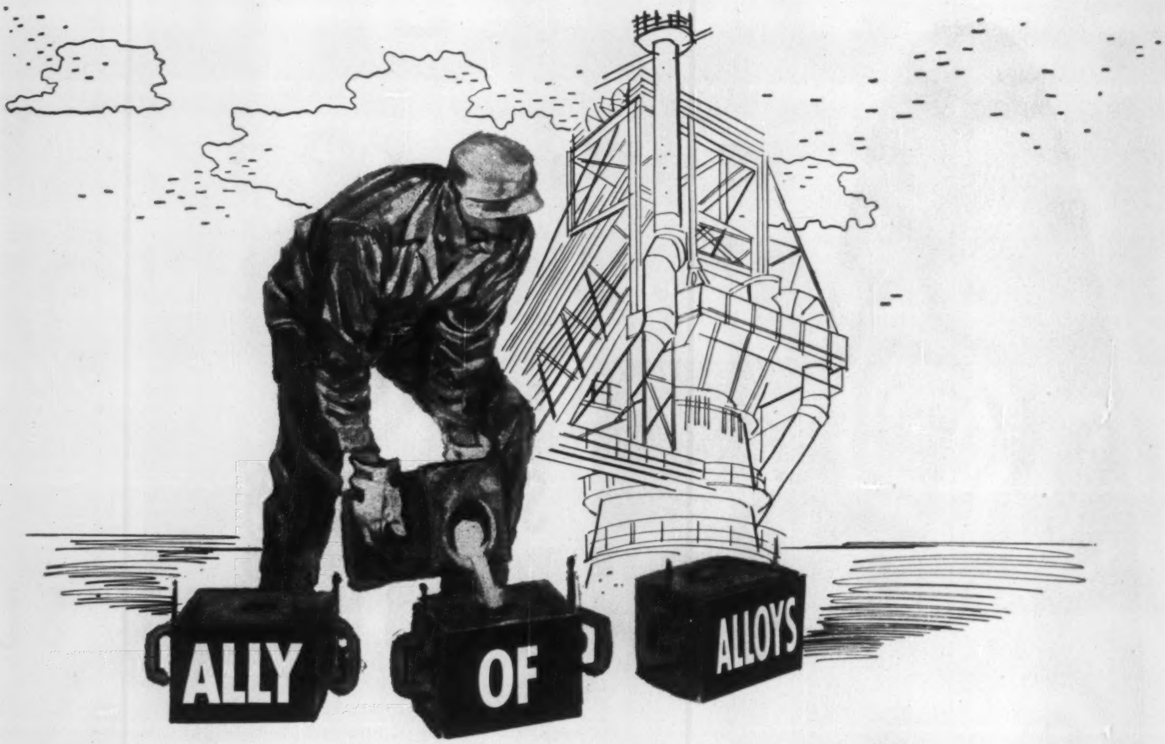

...the Miracle Metal ...LITHIUM

Lithium, like metallurgy, has come a long way. Once a laboratory curiosity, lithium is now the "catalyst of industry." Once the art of separating metals from their ores, metallurgy now embraces a whole new industry devoted to the manufacture and treatment of the alloys of these metals. And now—still another new field within a field—Lithium Metallurgy.

Lithium Ingots are used in the degasification of copper. Lithium Cartridges are used in the refinement of high temperature copper, and in brass, bronze and nickel-silver castings. Even the salts of lithium (Carbonate and Chloride, specifically) hold great promise for heat treating.

Lithium metal and its compounds could hold the same hope for *you*. We will be happy to discuss it at your convenience.

... trends ahead in industrial applications for lithium

**LITHIUM CORPORATION
OF AMERICA, INC.**
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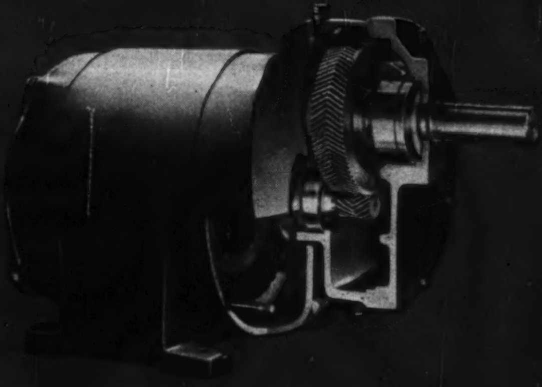


SINGLE REDUCTION
Parallel Shaft Type

MASTER -1st Choice
for GEARMOTORS
Because...

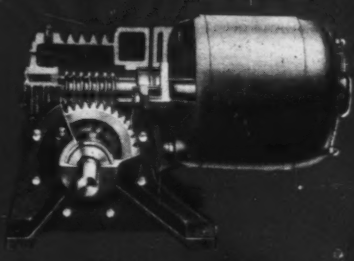
... With five types of parallel and right angle Gearmotors, Master has the flexibility and choice of design you need for selected output speeds.

... With electric motor and gears combined into a compact, integral power unit, you reduce costs and increase efficiency through elimination of belts, couplings, chains, sprockets, external bearings or separate reducers.

... Available in sizes from ⅛ to 125 H.P. You can integrate with the gearmotor electric brakes—3 types of variable speed units and fluid drive in any combination.

... And that's why more gearmotors carry the Master name than all other makes combined. Write on your business letterhead for details.

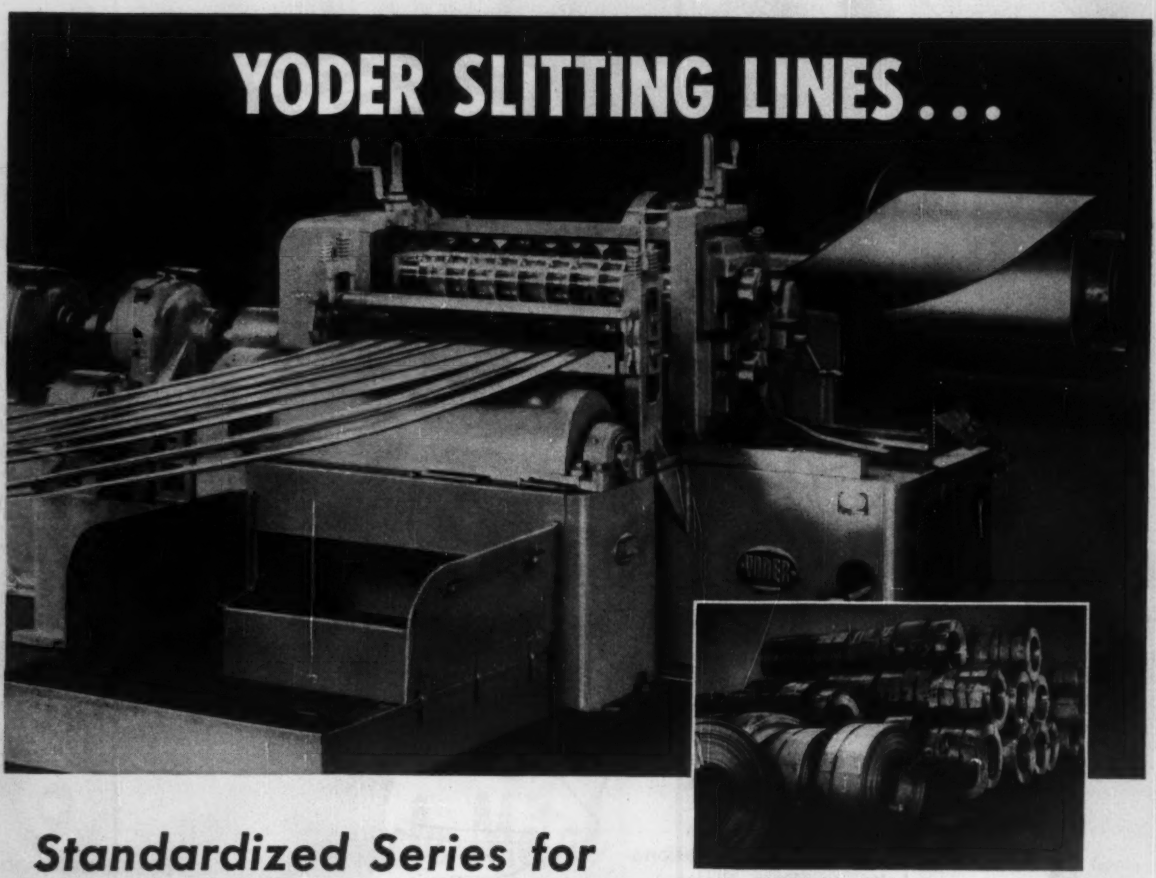
DOUBLE REDUCTION
Parallel Shaft Type



SINGLE REDUCTION
Right Angle Shaft Type

THE MASTER ELECTRIC COMPANY
Dayton 1, Ohio

YODER SLITTING LINES...



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LOW FIRST COST AND OPERATING COST!

A relatively small, low-cost Yoder slitting line offers attractive savings possibilities and high production in slitting small and medium coil sizes and strip gauges. Yoder has standardized a series of such machines, affording a rare combination of low cost and productive capacity amply sufficient for the needs of the great majority of sheet metal fabricators and custom slitting shops. Supplementing the standardized series are *special models for slitting big coils and heavy gauges at high speeds.*

For requirements as low as 100 tons per month, one of the standardized Yoder slitting lines will pay for itself in short order. The savings PER TON increase rapidly with decrease in coil size and width of strands to be slit.

Another important advantage gained by fabricators having their own slitter is the ability, from a relatively small stock of standard width coils, to meet expected and unexpected needs for slit strands in a few hours. This means easier production planning and greatly reduced strip inventories, in addition to lower prices and quicker deliveries of their strip purchases.

Yoder Slitter Book contains basic information on the economics and mechanics of slitter operation, with time and cost studies, production records and other valuable data. Send for it.

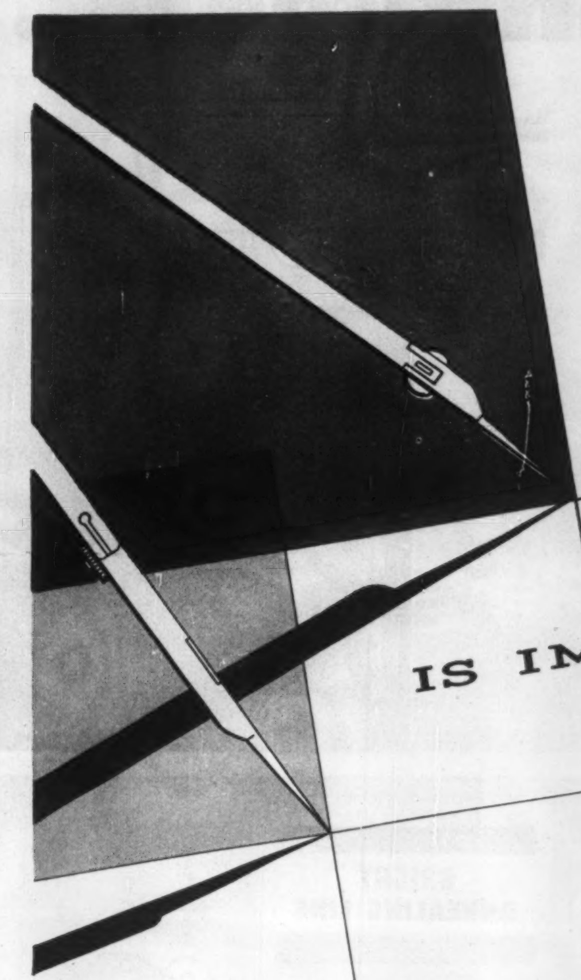
THE YODER COMPANY • 5502 Walworth Ave. • Cleveland 2, Ohio

ENGINEERING YODER MANUFACTURING

ROTARY SLITTING LINES

COLD ROLL FORMING MACHINES

ELECTRIC-WELD PIPE AND TUBE MILLS



Precision

IS IMPORTANT

Specify Bishop Stainless Steel Tubing
(.008" to 1" O.D.)

When precision is important, specify Bishop small diameter stainless steel tubing.

Bishop, the first American company to draw small diameter stainless steel tubing, takes pride in its precise control of all dimensional tolerances. This dimensional precision is made possible by continual inspection, both mechanical and visual, of all operations.

You buy Stainless Steel Tubing for its extra qualities. Get the added advantages of precision craftsmanship and experience by specifying Bishop.

Catalog on request.

The next time you need precision fabricated tubular parts, investigate Bishop's "under one roof" drawing and fabricating facilities . . . you'll save time and money.

Platinum and Platinum group metals
Spinnerettes
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Small Diameter Stainless Steel Tubing
Fabricated Tubular Parts

J. BISHOP & CO. PLATINUM WORKS
Stainless Steel Division, Malvern, Pennsylvania

It's Allis-Chalmers .

Motors, M-G Sets, Control, Switchgear... Dependable Allis-Chalmers Electrical Equipment Plays an Important Role in Steel Mill Expansion Programs

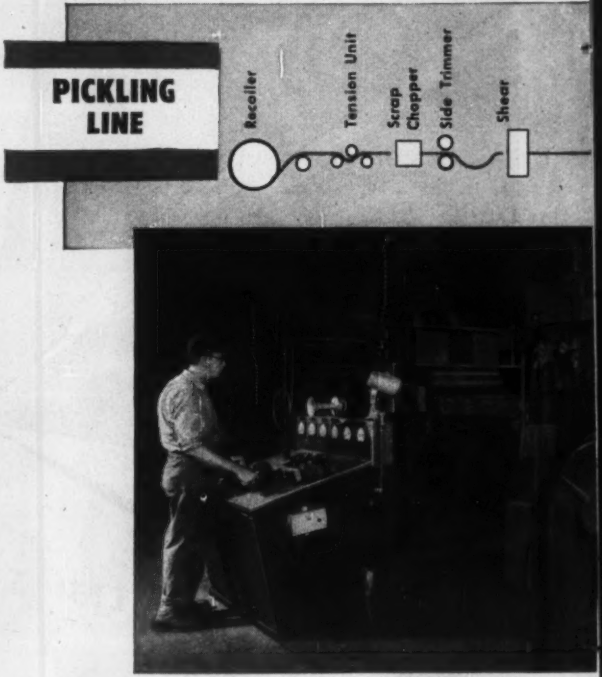
Demand for specialized steel remains at a record high. Steel producers are meeting the challenge with improvements on existing processing lines, or installation of new facilities for pickling and annealing operations.

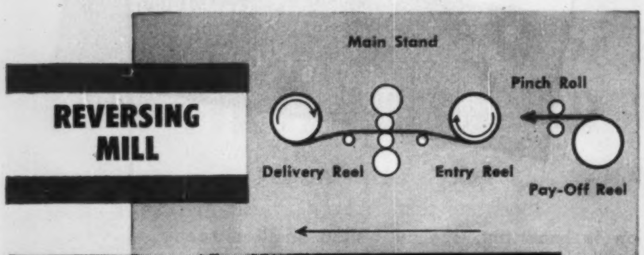
A recent installation of this type in an eastern steel mill featured Allis-Chalmers motors, m-g sets, control and operating stations, and switchgear throughout.

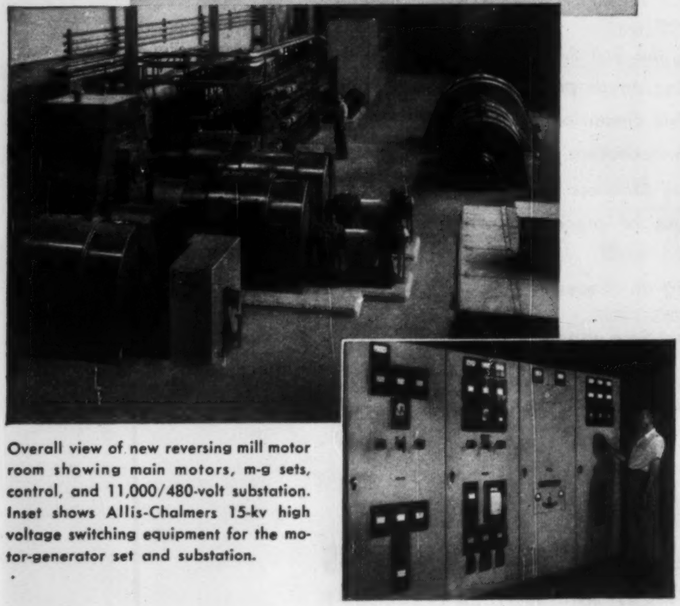
Allis-Chalmers equipment was chosen for this duty because of its record of quality, economy, durability . . . proven in years of heavy-duty steel mill operation.

Take advantage of Allis-Chalmers wide range of equipment and service. For help in planning new facilities or modernizing present plants, contact the A-C office in your district, or write Allis-Chalmers, Milwaukee 1, Wisconsin.

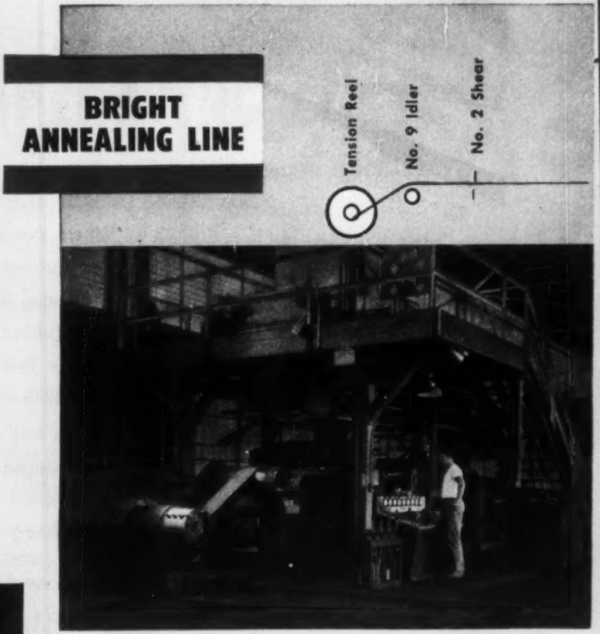
A-4872


PICKLING LINE
Recoiler
Tension Unit
Scrap Chopper
Side Trimmer
Shear


REVERSING MILL
Main Stand
Pinch Roll
Delivery Reel
Entry Reel
Pay-Off Reel



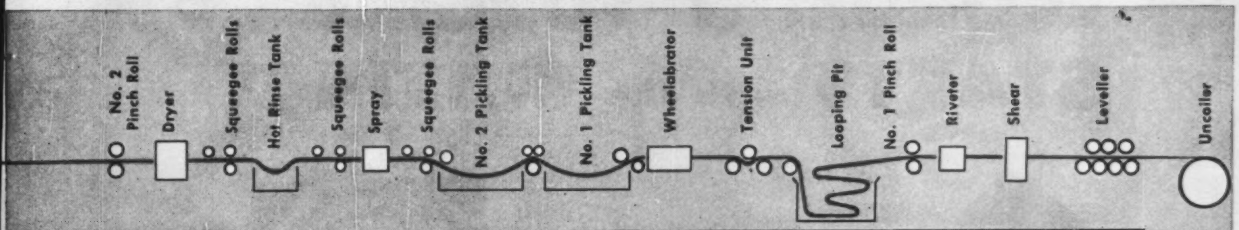
Overall view of new reversing mill motor room showing main motors, m-g sets, control, and 11,000/480-volt substation. Inset shows Allis-Chalmers 15-kv high voltage switching equipment for the motor-generator set and substation.


BRIGHT ANNEALING LINE
Tension Reel
No. 9 Idler
No. 2 Shear

Delivery end of new annealing line. Allis-Chalmers desk-type operators' control stations, as shown here, are used throughout these modern new facilities.

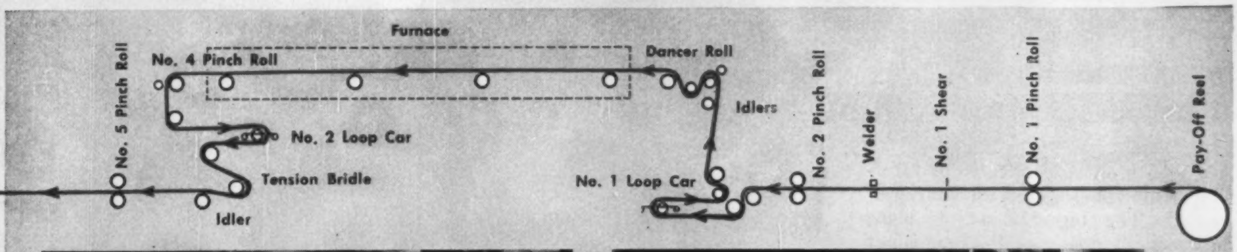
ALLIS-

. All Along the Line

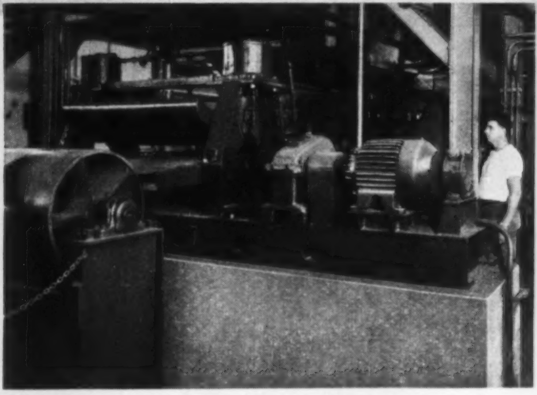

No. 2 Pinch Roll
Dryer
Squeegee Rolls
Hot Rinse Tank
Squeegee Rolls
Spray
Squeegee Rolls
No. 2 Pickling Tank
No. 1 Pickling Tank
Wheelabrator
Tension Unit
Looping Pit
No. 1 Pinch Roll
Riveter
Shear
Leveller
Uncoiler

Operator's station, entry end, 36-inch hot-rolled pickling line. Allis-Chalmers control, initiated from desk, gives positive, precision control of material speed.

Allis-Chalmers dc control board and metering panels, m-g set, on delivery section of the pickling line.


Furnace
No. 4 Pinch Roll
Dancer Roll
Idlers
No. 5 Pinch Roll
No. 2 Loop Car
Tension Bridle
Idler
No. 1 Loop Car
No. 2 Pinch Roll
Welder
No. 1 Shear
No. 1 Pinch Roll
Pay-Off Reel

Allis-Chalmers m-g set and dc control board on the annealing line. Allis-Chalmers m-g sets and controls are recognized in the steel industry for dependable, economical service.

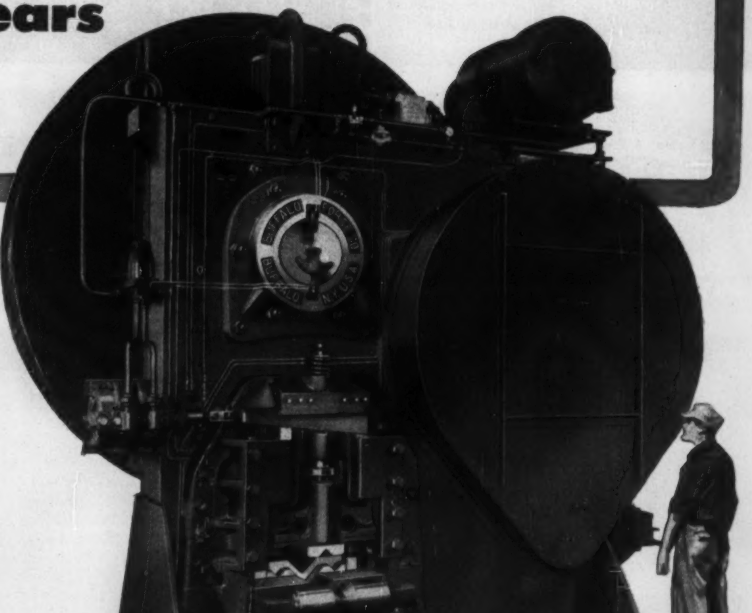


Pinch roll drive on delivery end of annealing line. Allis-Chalmers fan-cooled motors drive various parts of the processing line.

CHALMERS A-C ALLIS-CHALMERS

ECONOMY in FORGING STARTS with the CUTTING!

YOU CAN STEP UP OUTPUT and QUALITY with "BUFFALO" Billet Shears



First, the high cutting rates of "Buffalo" Billet Shears step up your production. The big No. 17 at right shears six 9″ squares or 10″ rounds per minute, and speeds are correspondingly higher in our smaller models. Second, your cuts are clean, square and uniform. The knife penetrates only 3/16″, localizing an accurate vertical fracture. *Write today for Bulletin 3295-B and see the "Q" Factor* features that make "Buffalo" Billet Shears your most economical and accurate means of preparing stock for forging.*

**The "Q" Factor—the built-in Quality which provides trouble-free satisfaction and long life.*

ESTABLISHED 1877
"Buffalo"
MEMBER N.M.T.B.A.

BUFFALO FORGE COMPANY
158 MORTIMER STREET BUFFALO, NEW YORK
Canadian Blower & Forge Co., Ltd., Kitchener, Ont.

DRILLING • PUNCHING • SHEARING • BENDING

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SOCKET SCREW PRODUCTS

always measure up!

QUALITY B-RIGHT-ON PRODUCTS ®

Socket screw users who want *what* they want *when* they want it know it pays to specify B-RIGHT-ON! Brighton Socket Screw Products *always* measure up.

Standard or special, Brighton Screws must meet and pass factory standards that are higher even than those specified by the ultimate user of the screws. Rigid control, from initial steel selection to final packaging, certifies every screw as B-RIGHT-ON quality.

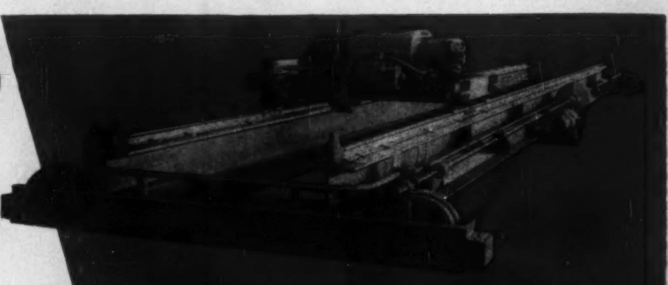
Selected mill supply houses, Brighton distributors, complete the control chain, assure the user of service and delivery as dependable as the screws . . . B-RIGHT-ON service.

Write for descriptive literature . . . see how

YOU CAN DO BETTER WITH B-RIGHT-ON.

THE BRIGHTON SCREW
& MANUFACTURING CO.
1835 READING ROAD CINCINNATI 2, OHIO

EUCLID
MATERIAL HANDLING EQUIPMENT
Since 1910



Typical double girder general purpose crane composed of standard components. A wide variety of spans and capacities available with floor, cab or remote controls. Modified as desired to meet special requirements.

Euclid Cranes and Hoists are produced by specialists to render efficient service with minimum attention.

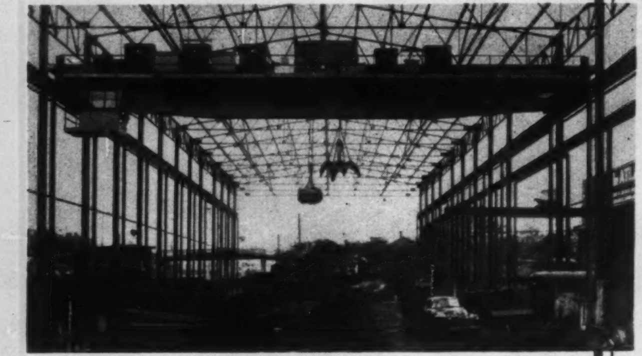
Their high quality is evidenced by a long list of discriminating purchasers and an impressive record of repeat orders.

Euclid Cranes are available in a large range of sizes and capacities. They include top running, underhung, single or double girder, motor driven or hand power, for all types of industry and service.

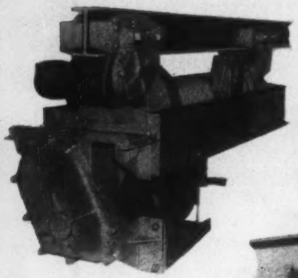
Trolleys are built with one or more hoists as required with any type of control. Top running, underhung, submerged or full revolving trolleys are available.

Special cranes are built to customers' specifications or to plans developed by our engineers.

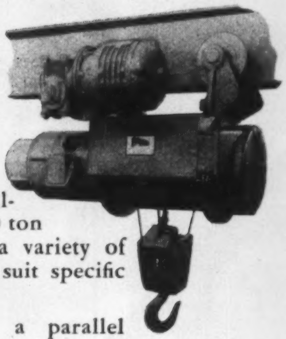
Typical machine tool assembly cranes. Crane in foreground utilized for sub-assemblies. High capacity two hoist crane in background handles small assemblies as well as the completed machines.



Long span heavy-duty, scrap yard crane with magnet and grapple designed to steel mill specifications.



High lift heavy-duty monorail hoist, designed for either motor driven or hand power trolleys, may be provided with cab or floor control in capacities up to 30 tons.



Series HB hoists are available in 3 to 10 ton capacities in a variety of mountings to suit specific requirements.

Illustrated is a parallel mounted hoist with cone gear trolley drive.

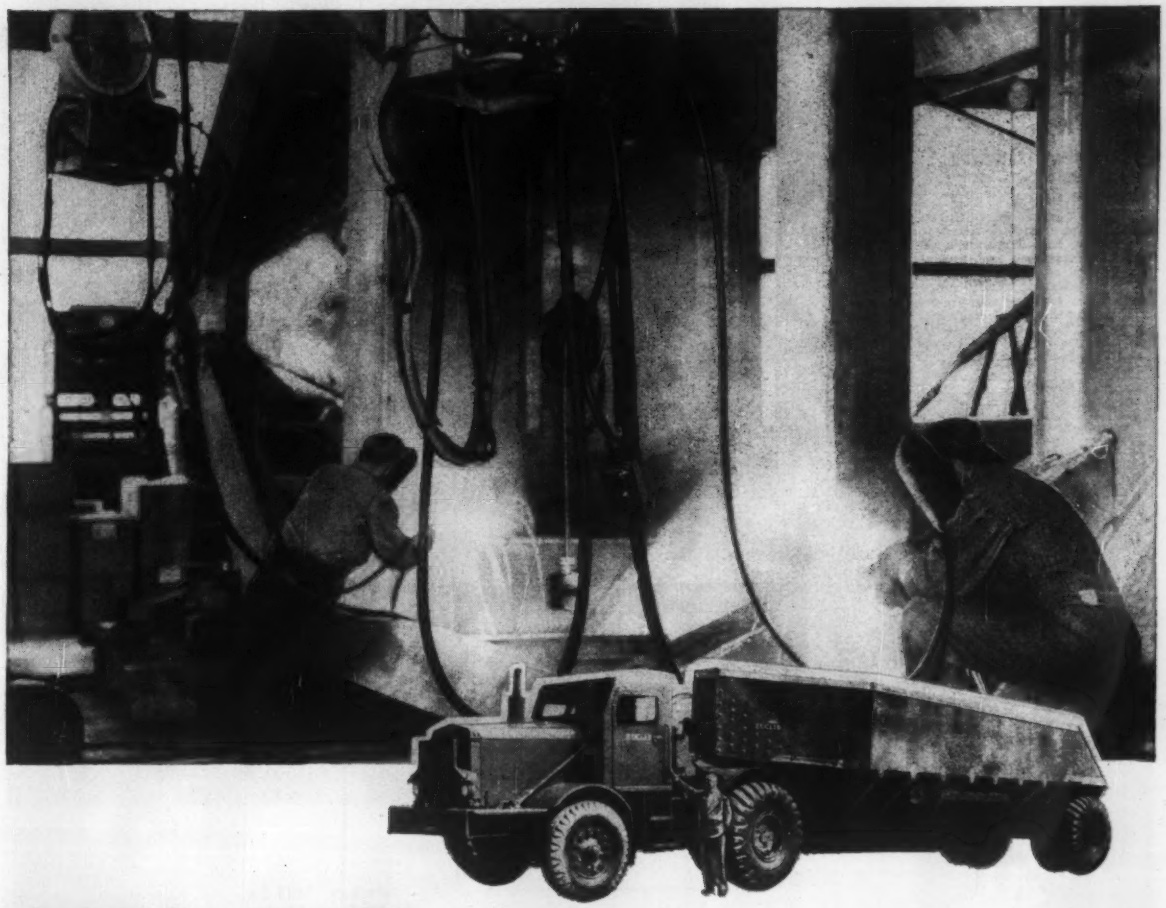
Heavy-duty gantry crane with four bridge motors. Designed for rugged continuous service.

Write for the Euclid Crane Catalog

stating the type and size of crane or hoist in which you may possibly be interested

The EUCLID CRANE & HOIST CO.

1365 Chardon Road • Cleveland 17, Ohio



33% Lighter...

Sigma Welding helps **up truck pay-load 5 tons**

The less weight consumed in a truck's structure, the more room there is for the all important pay-load. By sigma welding these giant drop-bottom dump trailers of sturdy aluminum alloy, 8,210 lb. dead-weight has been eliminated —and truck capacity increased 5 tons.

In this operation, sigma rod feed units are suspended above the work area to allow each operator complete freedom of movement with his sigma torch. Sigma welding operations are fast, and finished welds are of highest quality. The 36-ft. long trailers are fabricated of 5/16 and ⅝-in. plate, and ⅜ and ¾-in. channel extrusions.

Like many other products throughout industry, these trailers are being fabricated with new quality and efficiency using sigma welding with argon shielding. Sigma welding produces smooth, high-quality welds in all type joints, and exceeds 100 in. per min. in many operations. It is an efficient method for joining such metals and alloys as carbon steel, stainless steel, copper, bronze, aluminum, and unalloyed titanium. Start saving now with greater production speed and unit quality—call your local LINDE representative today.

Linde Air Products Company
A Division of Union Carbide and Carbon Corporation
30 East 42nd Street UCC New York 17, N. Y.
Offices in Other Principal Cities
In Canada: LINDE AIR PRODUCTS COMPANY
(formerly Dominion Oxygen Company)
Division of Union Carbide Canada Limited, Toronto

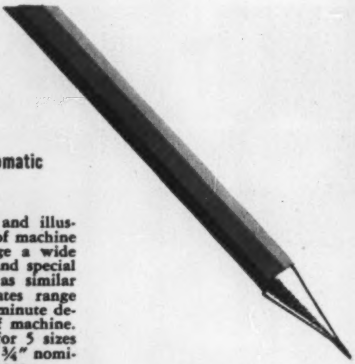
Linde
Trade-Mark

The term "Linde" is a registered trade-mark of Union Carbide and Carbon Corporation.

☐ **"Waterbury" Automatic Nut Formers**

Cir. No. 930-A-2

Describes operation and illustrates design details of machine which can cold forge a wide variety of standard and special nut blanks as well as similar parts. Production rates range from 60 to 125 per minute depending upon size of machine. Gives specifications for 5 sizes ranging from 1/4" to 3/4" nominal bolt capacity. 8 pages.

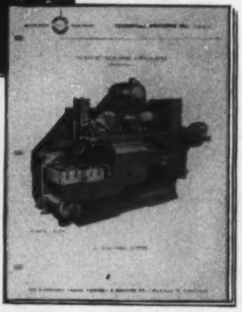


Waterbury
HIGH SPEED
THREADERS

☐ **High Speed Threader**

Cir. No. 942-A

Describes and illustrates completely new type of thread rolling machine which uses planetary dies to thread up to 2,000 blanks per minute.



☐ **High Speed Screw Slotter**

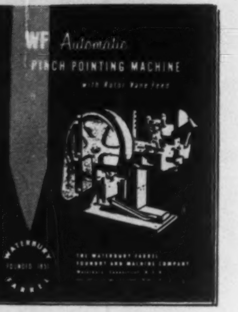
Bul. No. 106-A-3

Describes and illustrates WF's revolutionary new slotter—production team-mate of the new threader. Uses single feed mechanism and single saw to slot up to 2,000 burr-free blanks per minute.

Waterbury
AUTOMATIC
NUT FORMERS

ARE YOU UP-TO-DATE ON WF BOLT, NUT & SCREW MACHINERY?

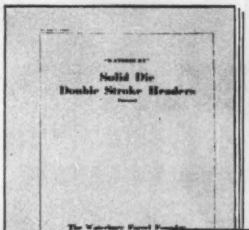
Send For Your **FREE** Copy Of These NEW Bulletins


WF Automatic
PINCH POINTING MACHINE
with Rotor Vane Feed

☐ **Automatic Pinch Pointing Machine**

Cir. No. 742-A-2

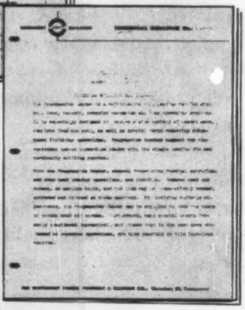
Describes and illustrates rotor vane feed pinch pointer with maximum production capacity of 150 per minute. Max. blank diameter 1/4". Max. length under head 2 1/2". Min. length under head 1/4". Shows typical work samples and gives table of specifications.


Solid Die
Double Stroke Headers

☐ **"Waterbury" Solid Die, Double Stroke Headers**

Cir. No. 933-A-2

Explains construction and operating features of crank type, two blow headers for producing the standard varieties of bolt and screw blanks as well as many special cold-forged products. Gives specifications for five sizes of long stroke and five sizes of short stroke machines handling wire diameters from 3/16" to 1/2". 8 pages.



☐ **"Waterbury" Progressive Headers**

Bul. No. 104-A-2

Covers features of multiple die cold heading machine which has roll feed, cut-off, transfer mechanism and four operating stations. Points out that machine can produce wide variety of headed work including hexagon head cap screw blanks and socket head cap screw blanks. Four sizes of headers are covered in the specification tables. 8 pages.

Write for circulars by number or check the ones you want and simply mail this page with your name and address to—

**WATERBURY FARREL
FOUNDRY & MACHINE
COMPANY
Waterbury, Connecticut**

**Offices: Chicago, Cleveland,
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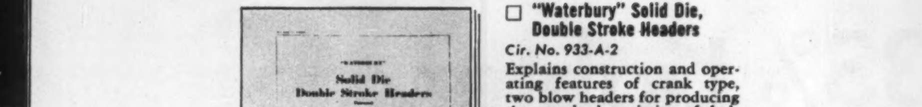
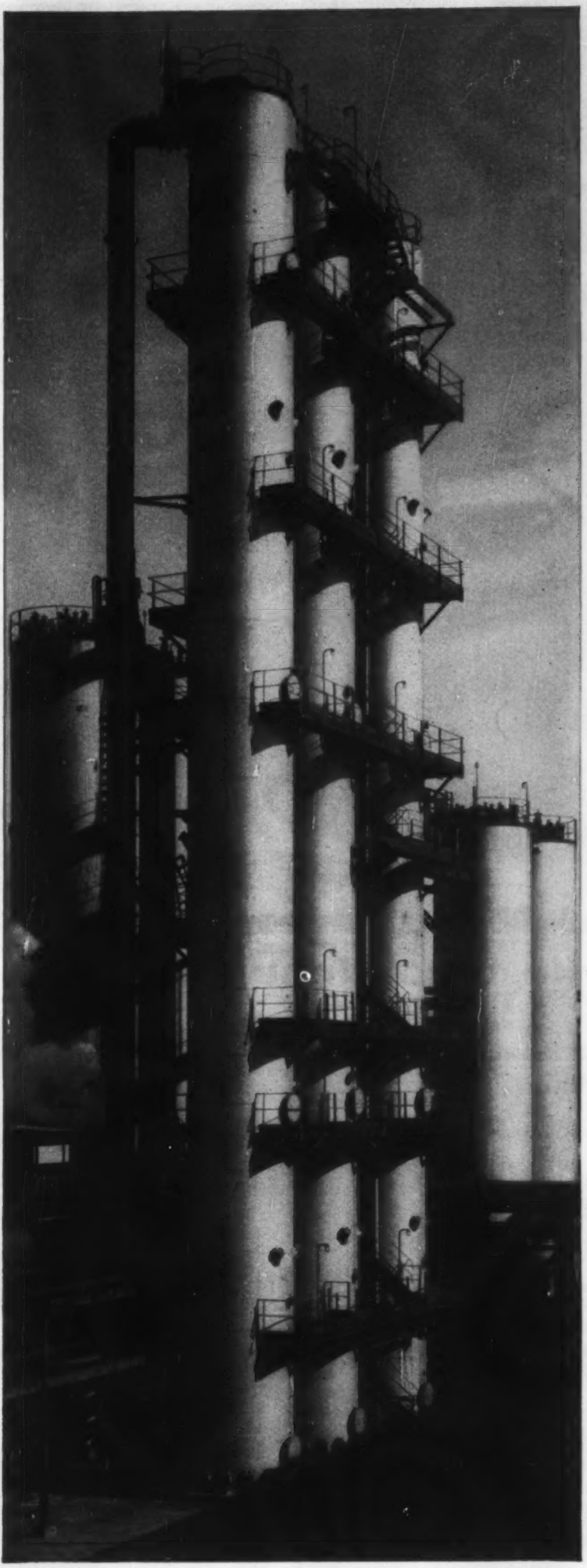
Waterbury Farrel


Bolt, Nut & Screw Machinery
Power Presses
Rolling Mill Machinery
Wire Mill Equipment
Sendzimir Mills & Other Special Machinery

WF-22



GRAVER

Gas and Chemical "scrubbers" for Great Lakes Steel

(DIVISION OF NATIONAL STEEL CORPORATION)

At Great Lakes Steel Corporation's Blast Furnace Division, a new by-product coke plant is equipped with a total of 25 large examples of Graver's craftsmanship in steel.

These structures, shop-fabricated at Graver's East Chicago plant and field-erected on the site by Graver crews, were built to the designs of Wilputte Coke Oven Division, Allied Chemical & Dye Corporation. These include bins, stacks, gas coolers, tanks for chemical feed, storage, and settling—and scrubbers such as the three 132′ towers shown at the left.

This variety of quality fabrication indicates Graver's versatile craftsmanship—demonstrates Graver's ability to shop-fabricate and field-erect structures for the steel, petroleum and chemical industries. For process and storage equipment in steels, alloys or clads, Graver's offices across the country are staffed with competent engineers ready to serve you.

GRAVER ... craftsmen in carbon, stainless and alloy steels

GRAVER TANK & MFG. CO., INC.
EAST CHICAGO, INDIANA

CHICAGO • NEW YORK • PHILADELPHIA • FONTANA, CALIF. • DETROIT
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When you need both
high heat resistance
and great physical strength

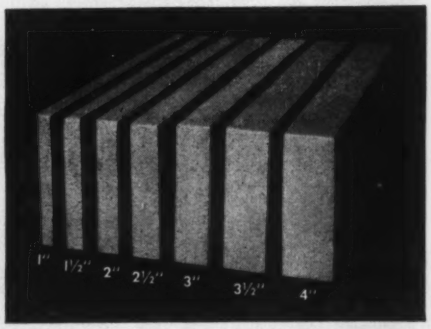
Specify J-M Superex, industry's favorite block insulation

Made from diatomaceous silica and asbestos for all temperatures to 1900F

YOU'LL ENJOY *greater insulation savings* with Superex®. Its unique combination of low conductivity and outstanding resistance to high temperatures provides greater operating efficiency and longer maintenance-free service. That's why Superex is the leading block insulation for furnace work.

Light and easy to work. Superex withstands temperatures to 1900F indefinitely with negligible loss of efficiency and is so strong that it compresses only ⅛ inch under 6 tons' pressure per square foot. Its light weight, excellent working properties and availability in large blocks mean quick, easy, low-cost installation.

For high temperature equipment. Since its introduction in 1927, Superex has received enthusiastic acceptance. Today it economically insulates 90% of the country's hot blast stoves. Other high temperature equipment where Superex has proved its superior performance include most types of industrial and metallurgical furnaces and ovens, stationary and marine boilers, regenerators, kilns, roasters, high-temperature mains, flues and stacks.



Saves waste—Superex comes in 7 standard thicknesses from 1" to 4". Other sizes available on order.

For further information on Superex, write to Johns-Manville, Box 60, New York 16, N. Y. In Canada, Port Credit, Ont.

JOHNS-MANVILLE JM PRODUCTS

Johns-Manville *first-in* INSULATION

MATERIALS · ENGINEERING · APPLICATION

JACK & HEINTZ Saves $15.84 per hour...

Jack & Heintz Inc. silver brazes over 25 different parts on this 15 KW, 10,000 cycle TOCCO machine.

with TOCCO* Induction Brazing

Brazing Costs Down

When Jack & Heintz engineers switched from torch brazing to automatic induction, brazing cost of these inverter brush mounts fell from $.05 to $.006 each—a reduction of 83% in direct labor costs alone! Additional savings result because less cleaning is required after TOCCO, and fuel costs are much lower, too.

Brazing Production Up

While costs dropped, production on the part zoomed—from 40 to 360 brazed assemblies per hour. Furthermore, rejects and scrap, formerly high, are now negligible.

Versatility

The part shown is just one of over 25 parts, large and small, which alert J & H engineers have converted from old-fashioned brazing methods to modern, automatic TOCCO. Overall brazing costs (TOCCO brazing versus former methods used) are down 75%—brazing speed, up 100%.

* * *

If the manufacture of *your* product involves brazing, heat-treating, forging or melting of ferrous or non-ferrous metals, don't overlook TOCCO as a sound method of increasing production, improving product quality and slashing costs.

THE OHIO CRANKSHAFT COMPANY

JUST PUSH A BUTTON

TOCCO

Mail Coupon Today

NEW FREE BULLETIN

THE OHIO CRANKSHAFT CO.
Dept. S-1, Cleveland 5, Ohio

Please send copy of "Typical Results of TOCCO Induction Brazing and Soldering".

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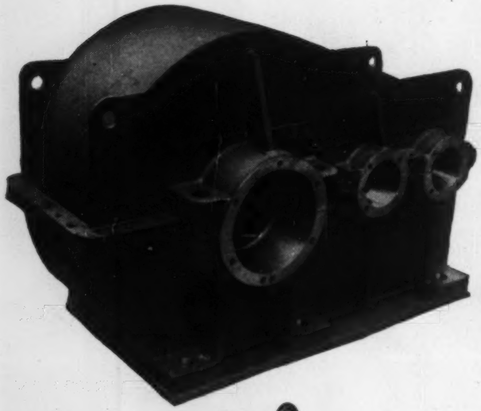
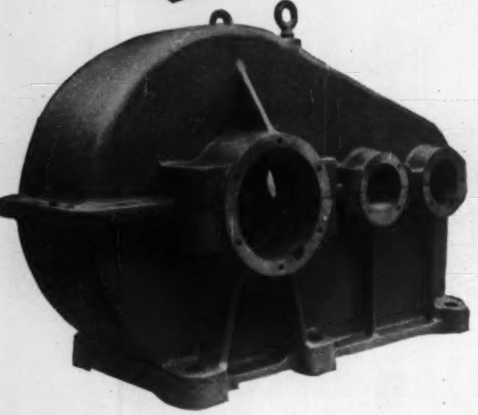
Case History No. 32 • SPEED REDUCER HOUSING



69 FABRICATED PARTS



2 GRAY IRON CASTINGS

Plus . . . 73% saving on cost of unmachined pieces.

Plus . . . 20% saving on machining cost.

The performance of the Gray Iron casting is superior to the assembly, because of Gray Iron's ability to absorb vibration. Furthermore, this characteristic provides the added dividend of quieter operation. Savings on the first three units made up the difference between pattern costs and template costs.

Look at the two housings. Consider appearance plus savings. Can there be any question about which is the better buy!

Somewhere in your plant, there must be a place where use of Gray Iron will save you money and improve your product.

For specific technical and business information, write direct to Gray Iron Founders' Society, Inc., National City—East 6th Building, Cleveland 14, Ohio.

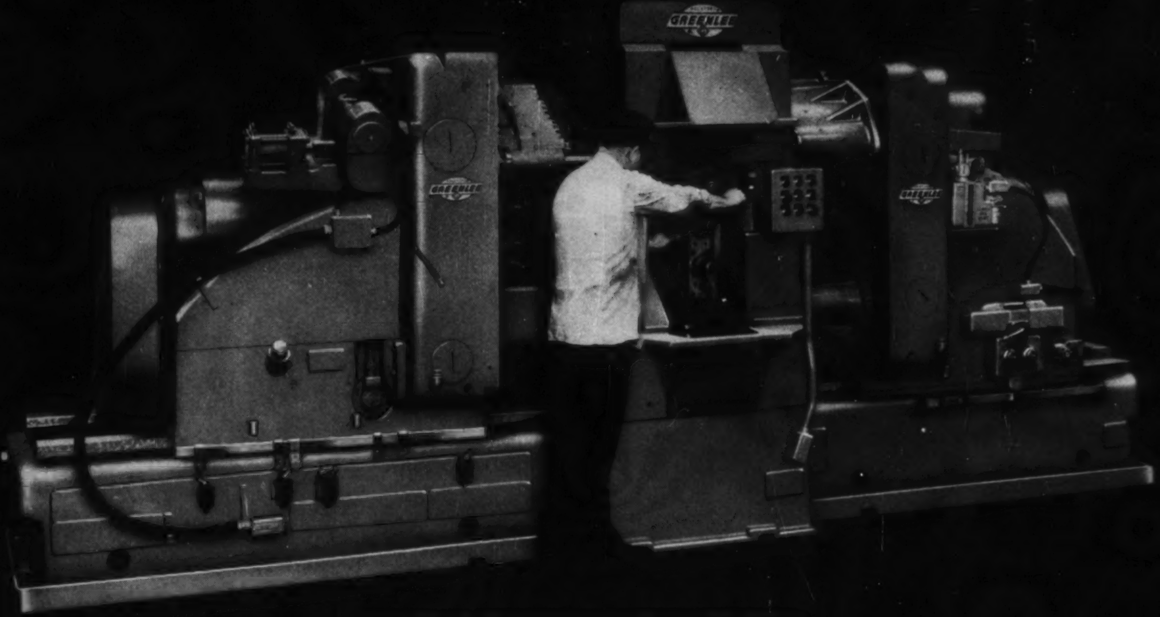
This symbol assures you the most for your casting dollar

Here's why it pays to call in one of the more than 500 leading foundries displaying the Society symbol:

- The most recent technical and business information is available to each member through the Society to help you design better products at lower cost.
- The use of sound cost accounting procedures is recommended and encouraged among Society member foundries, assuring full value for your casting dollar.
- Improved castings result from the advanced techniques and the high sense of responsibility of Society members.

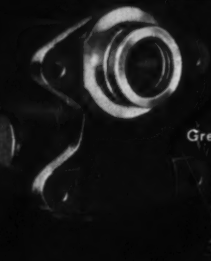
MAKE IT BETTER WITH GRAY IRON

GRAY IRON FOUNDERS' SOCIETY



GREENLEE

special-purpose machines for profitable mass production



Master brake cylinder machined on above Greenlee Special Machine.

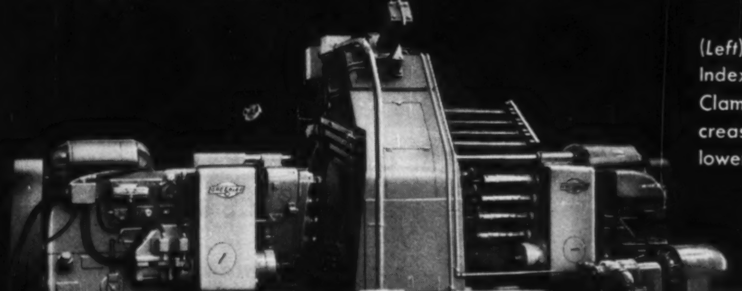
THEY SAVE WORK...THEY SAVE MONEY

If you are being outdistanced in today's swift race for production...faced with narrowing profit margins...it will pay to investigate Greenlee Special Machines. Savings effected on drilling, reaming, boring, counterboring and tapping operations will quickly amortize your invested dollars.

(*Above*) Greenlee Horizontal Indexing Machine designed for processing master brake cylinders has proved itself with raised quality and lowered costs.

Wheel cylinder machined on Greenlee Special Machine shown below.

(*Left*) Greenlee Two-Way Horizontal Indexing Machine equipped with Power Clamping and Automatic Unloading increased previous production rates and lowered costs.



WRITE FOR COMPLETE INFORMATION

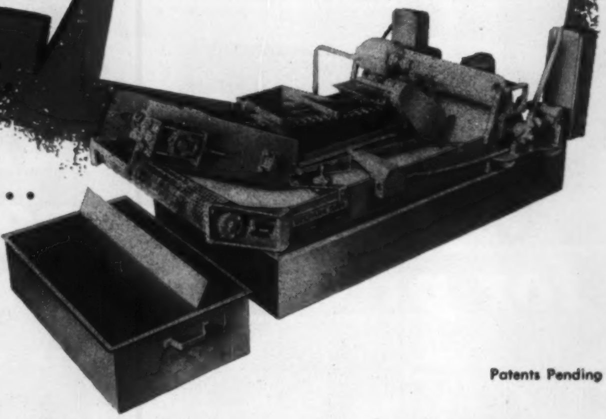
PRODUCTION MACHINERY
GREENLEE

GREENLEE
BROS. & CO.
1921 MASON AVENUE
ROCKFORD, ILLINOIS

Are You Looking For This?

- New method of gravity flow and magnetic attraction.
- Smaller filter . . . greater flow capacity.
- 85-90% more magnetic attraction.
- 25-50% less floor space required.
- More complete filtration.
- Greater swarf load capacity.
- Reduced operating costs.
- Out-performs all present units.

Announcing the NEWEST, MOST EFFICIENT, MOST POWERFUL MAGNETIC . . .



Patents Pending

Delpark's

Combined Magnetic Separator and Filter

CONTINUOUS, FULL FLOW, SELF-CLEANING, FULLY AUTOMATIC FOR THE REMOVAL OF FERROUS SLUDGE AND ABRASIVES FROM COOLANTS

Delpark

FIRST in Filtration Advancements

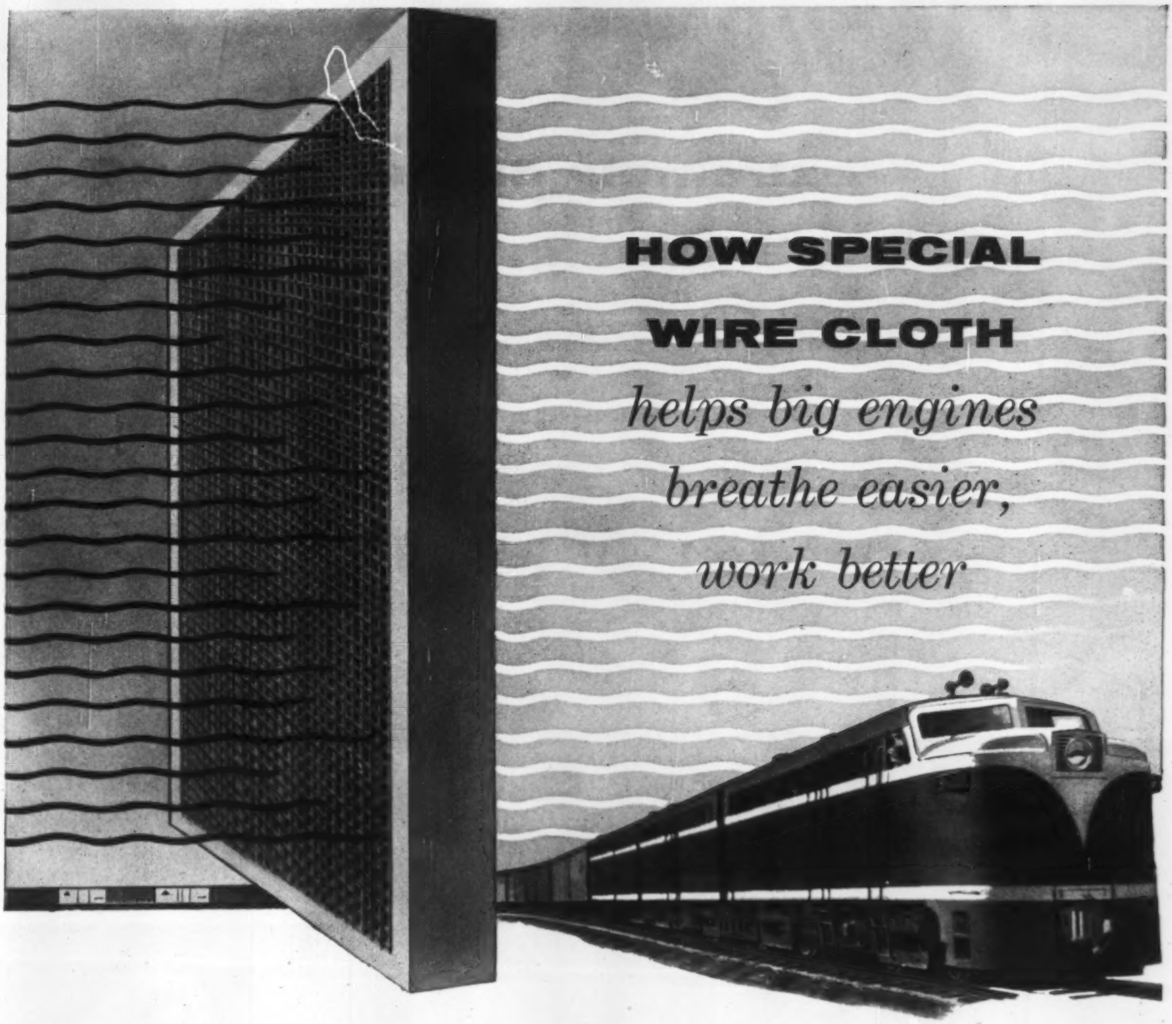
BACKED BY MORE THAN 40 YEARS EXPERIENCE IN INDUSTRIAL FILTRATION

UNEQUALLED IN EFFICIENCY . . . gives filtration performance never before possible on production work. The only separator using gravity flow of liquids *on top* of the greatest magnetic power giving benefit of both gravity and magnetic separation. Reduced filter size . . . **25 to 50% LESS FLOOR SPACE REQUIRED.**

Write for more detailed information.

INDUSTRIAL FILTRATION COMPANY

99 Industrial Avenue
LEBANON, INDIANA



HOW SPECIAL WIRE CLOTH *helps big engines breathe easier, work better*

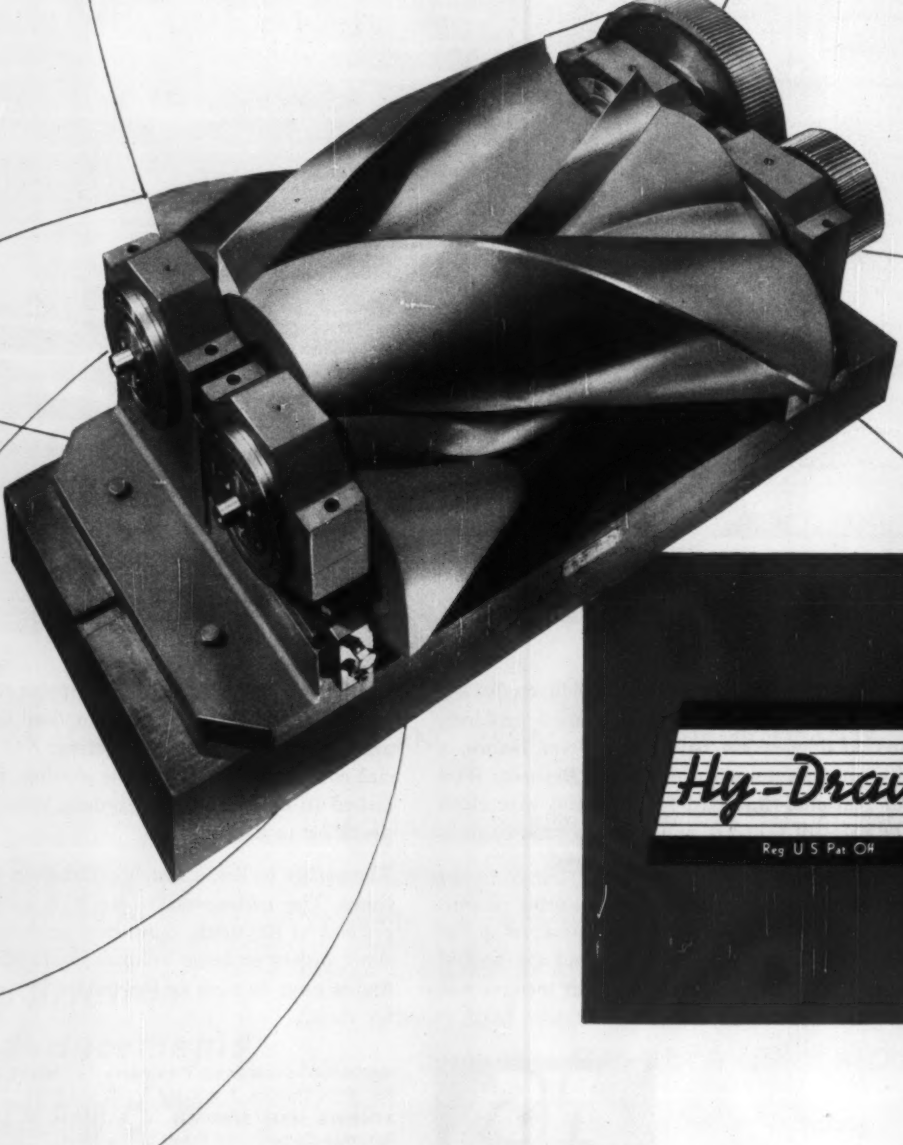
● Keeping harmful grit and dirt out of the lungs of big engines, like locomotive diesels, is no small problem. Determined to do the job better than ever before, a leading filter manufacturer turned to the *Reynolds Wire Division* of National-Standard for a special wire cloth that would trap all the dirt and still let such engines breathe the terrific volume of air they need.

No simple assignment this, for it took months of concentrated development work—not only to develop the *kind* of wire cloth that would do the job, but also to find out *how best* to produce it. It had to be slit into narrow widths, with special lock wires to prevent raveling. It had to withstand a patented method of severe forming and crimping without compacting. And despite the special construction and narrow slitting, it had to be furnished in extra large continuous rolls. All were tough problems to lick!

The *ability* to lick a tough problem in wire cloth is one thing. The *willingness* to do it is quite another. You get *both* at Reynolds Wire. But, problem or no problem, short orders or large volume production, you too will find it pays to turn to Reynolds. Try us and see.

NATIONAL-STANDARD COMPANY • NILES, MICHIGAN
Tire Wire, Stainless, Fabricated Braids and Tape
ATHENIA STEEL DIVISION • CLIFTON, N. J.
Flat, High Carbon, Cold Rolled Spring Steel
REYNOLDS WIRE DIVISION • DIXON, ILLINOIS
Industrial Wire Cloth
WAGNER LITHO MACHINERY DIVISION • JERSEY CITY, N. J.
Special Machinery for Metal Decorating
WORCESTER WIRE WORKS DIVISION • WORCESTER, MASS.
Round and Shaped Steel Wire, Small Sizes

extremely difficult job???



Hy-Draulic

Reg U S Pat Off

. . . not for a hydraulic

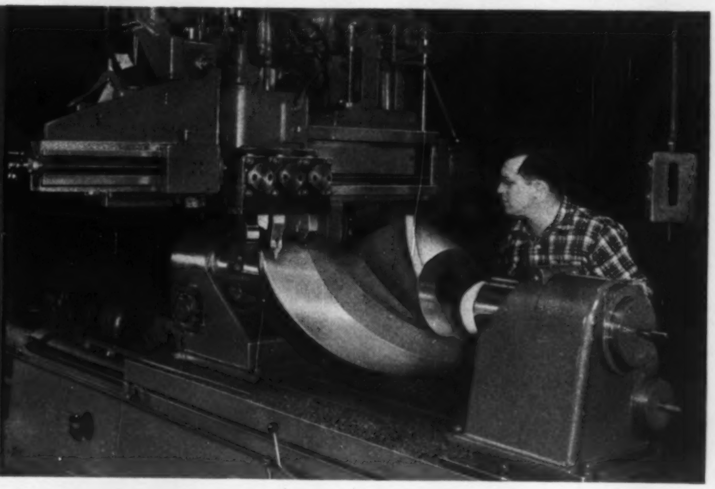
planer and duplicator

Here's another complex machining job solved by using a Hydraulic Kopy-Kat, with a rotor generating Hydraulic Shaper-Planer.

The part is a blower and consists of two sections — a two lobe rotor and a four lobe gate. The helix angle of the rotor is approximately 32 degrees.

Hydraulic Drive is a natural for extremely difficult shaping, planing, slotting and duplicating. It produces accurate work with substantial savings in production time — often several hundred percent over other methods.

Ask a Rockford Machine Tool Co. representative for the latest facts on modern Hydraulic Shapers, Planers, Slotters, Shaper-Planers and Kopy-Kats.



ROCKFORD MACHINE TOOL CO.

2500 KISHWAUKEE STREET • ROCKFORD, ILLINOIS

Type 500 Goodman Continuous Coal Mining Machine in operation.

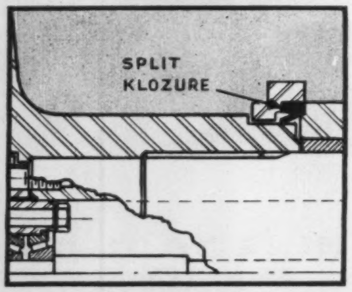
Garlock Split-KLOZURE Oil Seal—specifically designed for heavy equipment.

Goodman Mining Machines get positive bearing protection with KLOZURE* OIL SEALS!

The bearings on Goodman Mining Machines are subjected to the most severe service conditions—particularly coal dust and dampness. To provide positive protection for these costly bearings, Goodman engineers use dependable KLOZURE Oil Seals.

Garlock Split-KLOZURES, which can be installed around the shaft *without* dismantling the equipment, are used on the main bearing. Standard Model 53 Finger Spring KLOZURES (not illustrated) are used on the tractor roller bearings.

Let us show you how superior KLOZURE Oil Seals can solve your sealing problems. Just contact the Garlock office nearest you, or write for KLOZURE Catalog 10.



Cross section shows Garlock Split KLOZURE Seal as applied to the rotor assembly (main) bearing of Goodman's Type 401 Miner.

*Registered Trademark

THE GARLOCK PACKING COMPANY, PALMYRA, NEW YORK

Sales Offices and Warehouses: Baltimore, Birmingham, Boston, Buffalo, Chicago, Cincinnati, Cleveland, Denver, Detroit, Houston, Los Angeles, New Orleans, New York City, Palmyra (N.Y.), Philadelphia, Pittsburgh, Portland (Oregon), Salt Lake City, San Francisco, St. Louis, Seattle, Spokane, Tulsa.

In Canada: The Garlock Packing Company of Canada Ltd., Toronto, Ont.

GARLOCK

SUITABLE FOR FRAMING...

Suitable for Reynolds Aluminum Window Frames to be specific!

Reynolds makes lots and lots of window
frames for lots and lots of people . . .
just because they *are* so suitable!

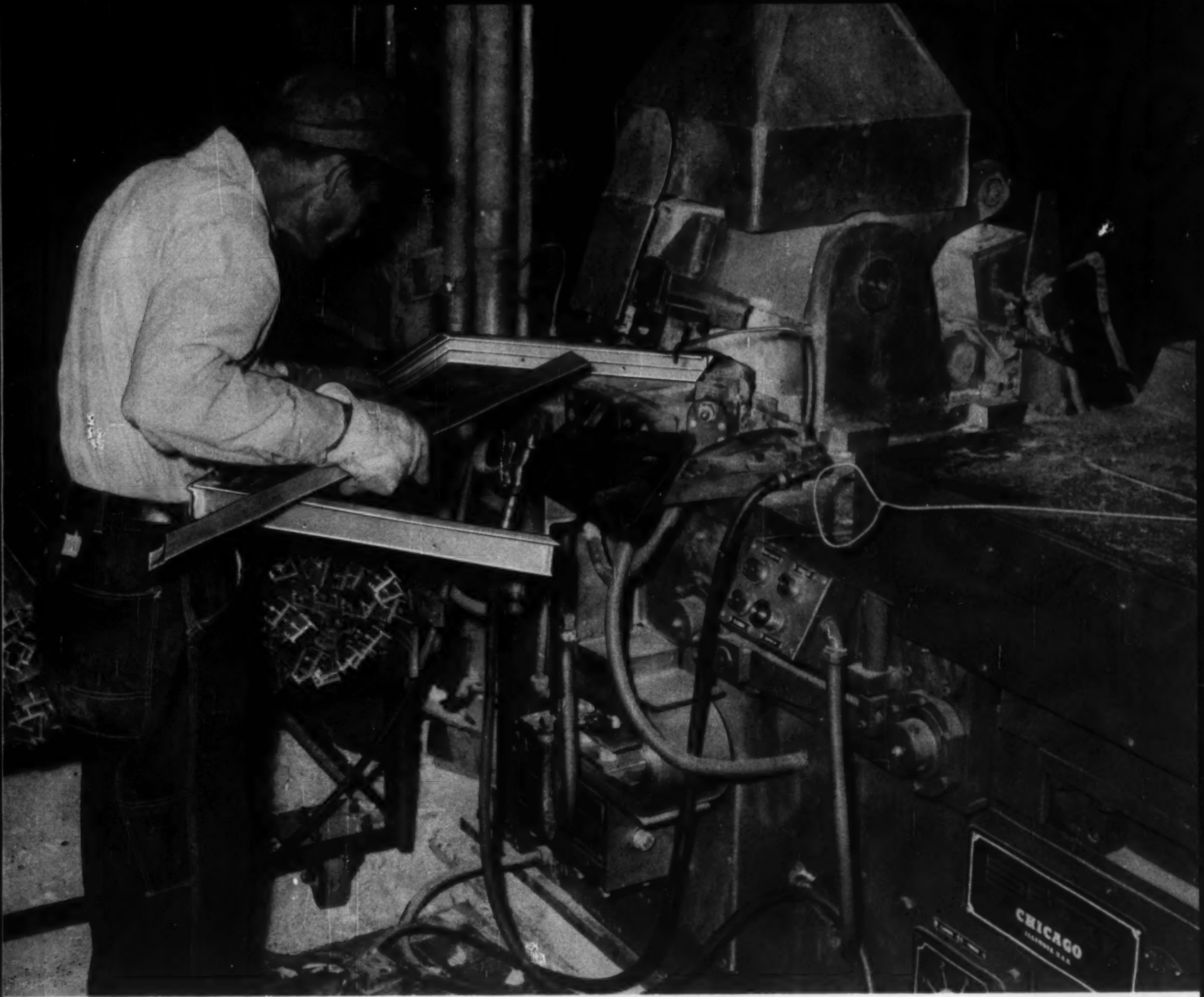
That so-called "suitability" is a combination of proper design and appealing price. As *you* well know, design and price depend on the method of fabrication and its cost. And suitably enough, Reynolds uses Sciaky Resistance Welding to produce those frames.

If *you* combine good design and appealing price like Reynolds does, you'll have "lots and lots" of customers to make your efforts profitable, too!

SCIAKY®

Largest Manufacturers
of Resistance Welding Machines in the World

Don't take our word for it — turn the page and look at the facts for yourself.



Production increased 66%, unit costs reduced 25% with Sciaky Resistance Welding

How old is "antique"?

Recent Sciaky technical achievement in resistance welder design may make welders only five years old obsolete.

Production limitations, high operating cost, and greater maintenance requirements make these "antiques" expensive to own. You can't be competitive if the cost of your product won't let you compete.

Aluminum window frame production jumped 66% with two Sciaky 200 KVA Flash Butt Welders at the Reynolds Metals fabricating division in Louisville, Kentucky.

Three arc welder set-ups and five expensive jigs were eliminated. Labor demand for the welding operation was reduced 43%, releasing skilled men for other important work.

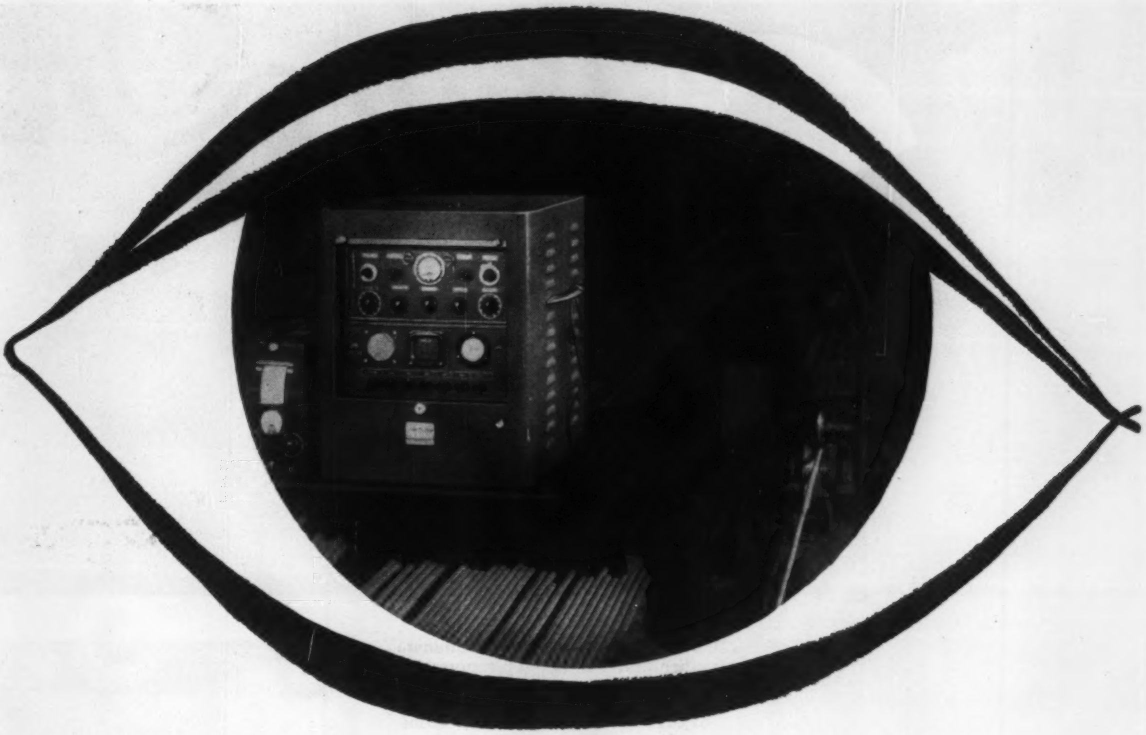
The Sciaky resistance welders now provide a completely water tight frame. Rejects are virtually eliminated. Maintenance has been reduced to minimum routine service. With all these advantages, it's easy to understand the 25% lower unit production cost.

"Resistance Welding At Work," Vol. 4 No. 7, details the Reynolds story. Write today for your free copy of this dramatic proof of Sciaky basic design thinking—welders to do *more useful work* at *lowest operating cost* with *maximum reliability.*

Largest Manufacturers of Resistance Welding Machines in the World

SCIAKY®

Sciaky Bros., Inc., 4912 West 67th Street, Chicago 38, Ill., Portsmouth 7-5600



a new "EYE" at *Carpenter*...

GIVES YOU THE HIGHEST DEGREE OF PERFECTION POSSIBLE IN STAINLESS TUBING!

Now, minute tubing defects invisible to the human eye . . . even those not detectable by any other production non-destructive testing method, will not escape the penetrating eye of a new non-destructive test in the Carpenter mill.

It's the most exacting and thorough quality control device ever developed for testing austenitic stainless tubing during production. Flaws that don't show up in hydrostatic tests are brought to light by this new testing device as it critically scans the entire I.D. and O.D. periphery of the tubing. It also detects variations in composition, gauge, sub-surface and surface conditions at production speeds.

What does this newest Carpenter advance mean to you? It means that Carpenter now assures you of better-than-ever quality . . . the highest degree of perfection possible in stainless tubing. It means added assurance for you that Carpenter Stainless Tubing, more than ever, is your best buy for life-long trouble-free service.

Ask your Carpenter Representative or local Carpenter Distributor for more details about this new quality control measure. Specify Non-Destructive Test on your inquiries and orders.

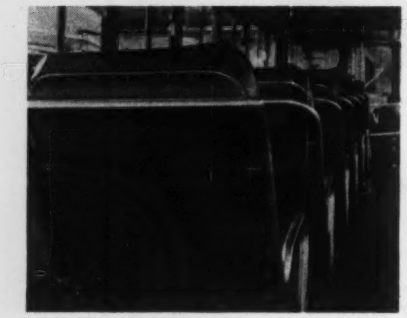
MEMBER

The Carpenter Steel Company,
Alloy Tube Division, Union, N. J.

Export Dept.: The Carpenter Steel Co., Port Washington, N. Y.—"CARSTEELCO"

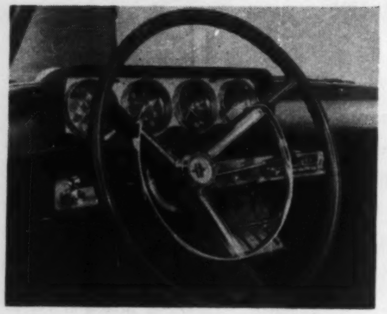
Carpenter

Stainless Tubing & Pipe



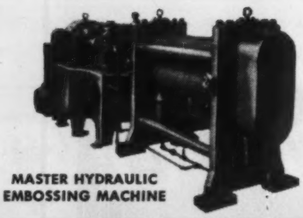
Reduce replacement costs? Eliminate frequent refinishing? Transportation companies report that embossed metal seat backs look better, last longer, conceal scuffs and scratches and eliminate the need for costly refinishing.

Add elegance and glamour to your product? Look at the interior appointments of modern automobiles! Dashboard trim, radio grilles and instrument panels are embossed for greater beauty. Embossing also diffuses reflected light for greater driver comfort and safety. Decorative strips on doors and sills are made both glamorous and durable through rotary embossing.

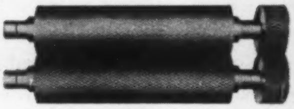


Increase sales appeal? Reduce material costs? Consumer products move faster at point of sale when the magic touch of rotary embossing is applied. They're more durable because embossing increases rigidity and strength. Yet lighter gage sheet, strip or coil can be used to obtain the same strength previously available only through the use of heavier gage metal.

Rotary embossing can add to the value, appearance and strength of *your* product. Let MEMCO show you how. Write for complete information.



MASTER HYDRAULIC EMBOSSING MACHINE



ENGRAVED MATCHED HARDENED FORGED STEEL ROLLS

MEMCO

MODERN ENGRAVING AND MACHINE CO.

HILLSIDE 5, NEW JERSEY

NOW— *from Borg-Warner's centrally located Ingersoll Steel Division, at New Castle, Indiana...*

FORGING QUALITY

INGOTS

UP TO

23,000 POUNDS

to your own analysis

If you've been looking for a dependable source for ingots of superior forging quality, it will pay you well to see how Ingersoll can serve you with:

- **Electric furnace carbon steel or alloy grades to your own analysis and specifications.**
- **Ingots in any size and shape from 400 pounds to 23,000 pounds.**
- **Great flexibility in production schedules—set up to fit in with your own forging requirements.**
- **Ample capacity to meet your needs . . . on schedule.**
- **The assurance of uniform high quality from one heat to the next.**

FOR FULL DETAILS—WRITE, WIRE OR PHONE—NOW

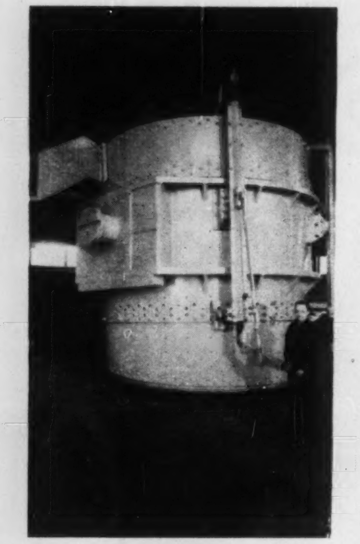
INGERSOLL STEEL
B-W
BORG-WARNER

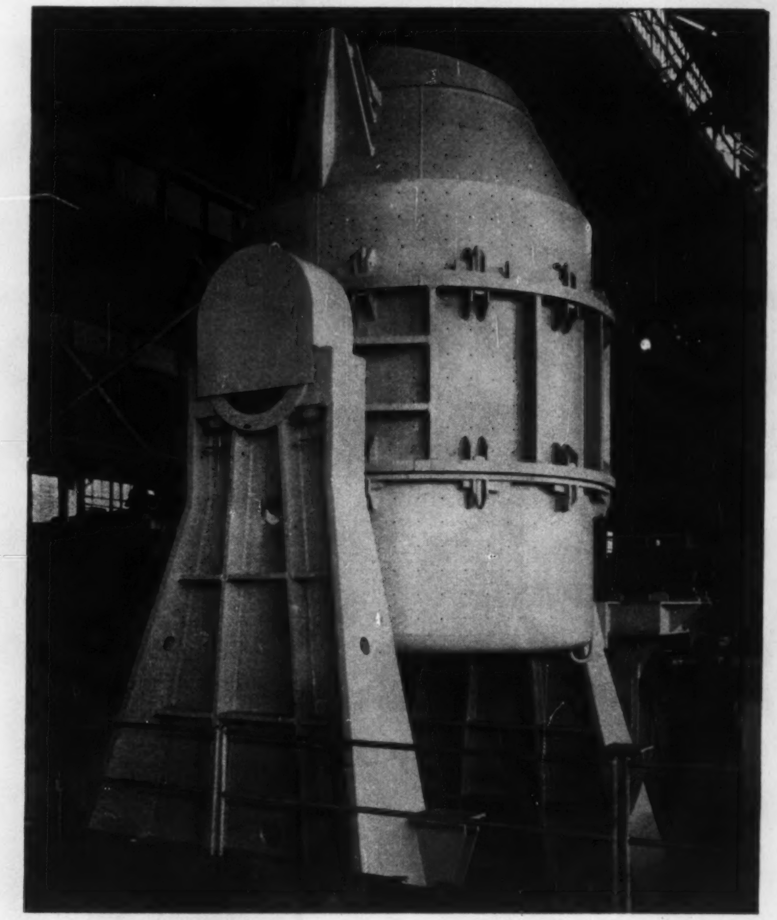
Ingersoll
STEEL DIVISION
Borg-Warner Corporation
New Castle, Indiana

alloy steels • armor plate • carbon electric steel for tank clutch discs • clutch plate steels • heat-resisting steels • IngAclad stainless-clad steel • knife steels saw steels, including high speed hack saw blade steels shovel steels • soft center steel • stainless steels Tem-Cross cross-rolled steel • tillage steels.

OXYGEN CONVERTERS

AND AUXILIARIES





ONE OF THREE 35-TON OXYGEN CONVERTERS FURNISHED McLOUTH STEEL CORPORATION COMPLETELY FABRICATED AND ASSEMBLED IN PENNSYLVANIA ENGINEERING CORPORATION SHOP

LADLES

SCRAP CARS

SLAG CARS

INGOT CARS

THERMO-METAL CARS

GAS CLEANING SYSTEMS

SMOKE HOODS

The Oxygen Converter Process for making high-quality, low-carbon steels made its debut in the United States. Pennsylvania Engineering Corporation—oldest, most experienced builder of converters—is justly proud to have been called upon to build the first Oxygen Converters ever made in America.

PEC OR

PENNSYLVANIA ENGINEERING CORP.

STEEL "CUSTOM TAILORED" FOR OVER 75 YEARS

NEW CASTLE, PENNA.

HOUGHTON CAN HELP YOU WITH YOUR SURFACE TREATMENT PROBLEMS

PICKLING — Acitrol, the new, more efficient pickling inhibitor, withstands high temperatures for long periods—saves acid, saves steel, produces a better pickled finish.

CLEANING — In addition to a full line of alkaline, acid and emulsion cleaners, and detergents, Houghton offers the new Houghto-Clean Cold Cleaners for both production line power washers and still tank cleaning.

PHOSPHATING — Both iron and zinc phosphate coatings: Houghto-Clean 313A is a highly efficient cleaner that produces an iron phosphate coating on the metal . . . aids paint adhesion. Houghto-Phos is a zinc phosphate treatment for subsequent drawing or painting operations.

BLACKENING — Houghto-Black, a one-step metal blackening product that is easy to use—imparts a lustrous, durable finish.

PROTECTING — Houghton, the pioneer in rust prevention, has a complete line of Rust-Veto rust preventives for short term or long term protection of metal surfaces against rust and corrosion.

Whether your problem involves surface treatment of metal prior to further processing, or protection against rust and corrosion, or a permanent, attractive, saleable finish, there is a Houghton product and process that can profitably meet your need. Ask your Houghton Man for help on any one or all of these metal surface processes. E. F. Houghton & Co., 303 West Lehigh Ave., Philadelphia 33, Pa.

. . . products of

E. F. HOUGHTON & CO.
PHILADELPHIA · CHICAGO · DETROIT · SAN FRANCISCO

Ready to give you on-the-job service . . .

CHEMICAL USERS' GUIDE To General Chemical Products for the Metal Industries

PRODUCT	AVAILABLE FORMS	COMMERCIAL STRENGTHS	SHIPPING CONTAINERS	APPLICATIONS
Sulfuric Acid H_2SO_4	Liquid	66° Be (93.19%) 99% Oleum, 20-65%	Carboys (except Oleum) Steel Drums Tank Trucks Tank Transports Tank Cars	Pickling and descaling; electroplating; bright dipping; electrolytic polishing; galvanizing; anodizing.
Hydrochloric Acid HCl + water *(Muriatic Acid)*	Liquid	18° Be (27.92%) 20° Be (31.45%) 22° Be (35.21%)	Carboys Tank Trucks Tank Cars	Pickling; electroplating; bright dipping; galvanizing; tinning; etching metals; dissolving metals.
Nitric Acid HNO_3 + water	Liquid	36° Be (52.30%) 38° Be (56.52%) 40° Be (61.38%) 42° Be (67.18%) 95%	Carboys (except 95%) Drums Tank Cars	Pickling; electroplating; bright dipping; oxide finishing; dissolving and stripping metals.
Hydrofluoric Acid HF + water	Liquid	60% 70%	Steel Drums & Tank Cars	Pickling; electroplating; electrolytic polishing; bright dipping.
Sodium Fluoride NaF	White Powder	95% or 97% Light or Dense	Multiwall Paper Bags Fibre Drums	Manufacture of rimmed steel; heat treating; galvanizing; pickling; electroplating.
Sodium Bifluoride $NaHF_2$	White Powder	95% or 97% $NaF \cdot HF$	Fibre Drums	Electroplating.
Trisodium Phosphate $Na_3PO_4 \cdot 12H_2O$ *(TSP)*	Crystal	P_2O_5—18.4%	Multiwall Paper Bags Fibre Drums	Alkali cleaning.
Sodium Metasilicate $Na_2SiO_3 \cdot 5H_2O$	White Granules	98.5%	Multiwall Paper Bags Fibre Drums	Alkali cleaning.
Oxalic Acid $C_2H_2O_4 \cdot 2H_2O$	Colorless Crystals	99.5%	Multiwall Paper Bags Fibre Drums	Oxide finishing; metal cleaning.
Potassium Fluoborate KBF_4	White Powder	97.0%	Fibre Drums	Aluminum and magnesium casting; as a flux and grain refiner for aluminum; for removing magnesium from secondary aluminum alloys.
Sodium Fluoborate $NaBF_4$	White Powder	94.0%	Fibre Drums	
Ammonium Fluoborate NH_4BF_4	White Powder	96.0%	Fibre Drums	Aluminum and magnesium casting; electroplating.
Fluoboric Acid HBF_4 + water	Liquid	42.0%	Rubber Drums	Electroplating; metal cleaning or dipping; electropolishing.
Lead Fluoborate $Pb(BF_4)_2$ + water	Liquid	51.0%	Carboys	Electroplating.
Tin Fluoborate $Sn(BF_4)_2$ + water	Liquid	47.0%	Carboys	Electroplating.
Copper Fluoborate $Cu(BF_4)_2$ + water	Liquid	45.0%	Carboys	Electroplating.
Iron Fluoborate $Fe(BF_4)_2$ + water	Liquid	45.0%	Carboys	Electroplating.
Nickel Fluoborate $Ni(BF_4)_2$ + water	Liquid	42%	Carboys	Electroplating.

The products advertised are commercial chemicals having various uses, some of which may be covered by patents, and the user must accept full responsibility for compliance therewith.

OTHER PRODUCTS: Acetic Acid; Ammonium Thiosulfate Solution; Aqua Ammonia; Barium Fluoride; Chromium Fluoride; Copper Fluoride; Copper Sulfate; Glauber's Salt; Iron Sulfide; Nickel Fluoride; Perchloric Acid; Sodium Bisulfite, Anhydrous; Sodium Silicate; Sodium Sulfite, Anhydrous; Stannous Chloride; Tetrasodium Pyrophosphate; Phosphoric Acid; Sodium Tripolyphosphate.

GENERAL CHEMICAL DIVISION

ALLIED CHEMICAL & DYE CORPORATION
40 Rector Street, New York 6, N. Y.

Offices: Albany • Atlanta • Baltimore • Birmingham • Boston • Bridgeport • Buffalo • Charlotte • Chicago Cleveland • Denver • Detroit • Greenville (Miss.) • Houston • Jacksonville • Kalamazoo • Los Angeles Milwaukee • Minneapolis • New York • Philadelphia • Pittsburgh • Providence • San Francisco • Seattle St. Louis • Yakima (Wash.)

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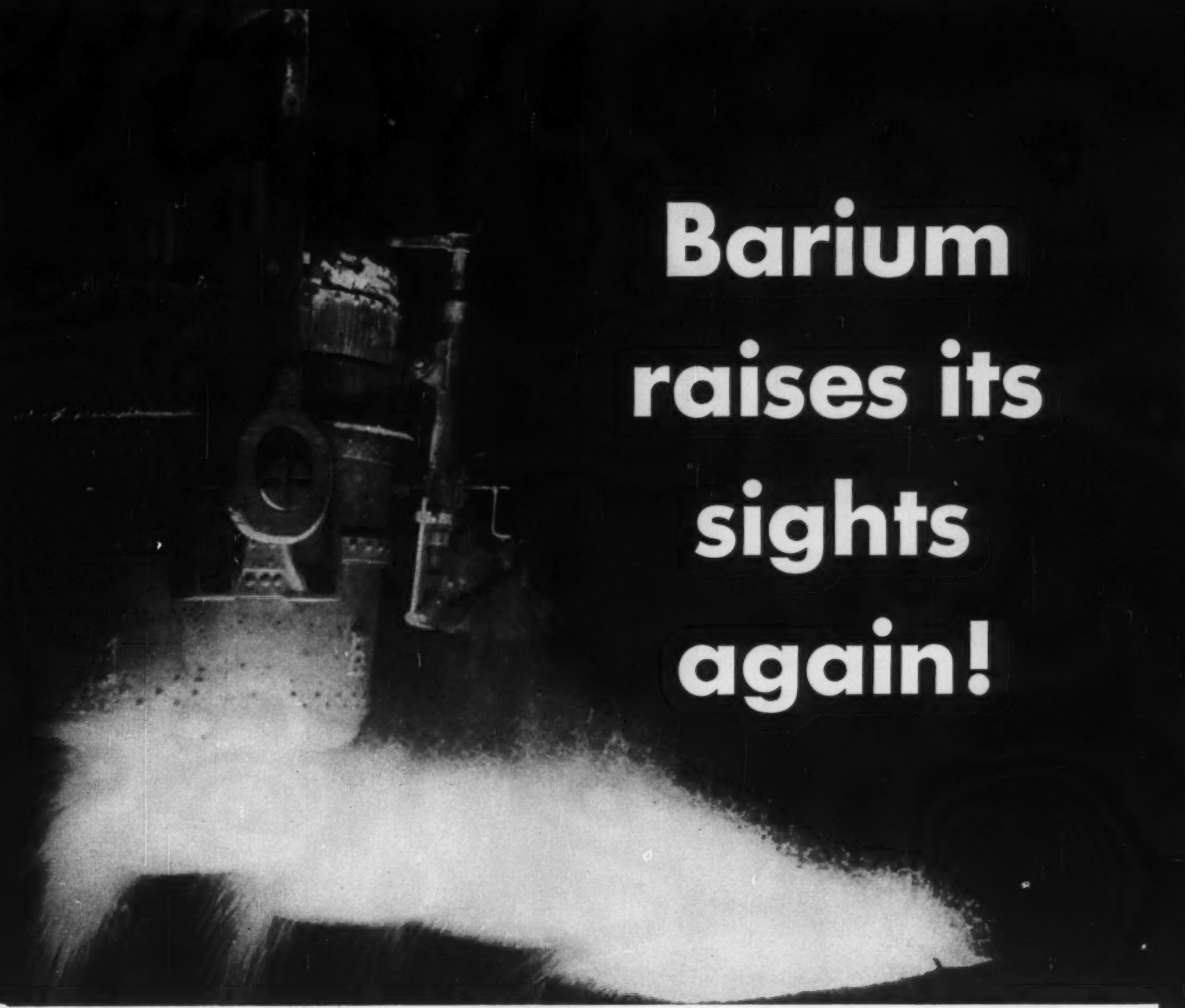
Allied Chemical



Merger of steel operations to step up efficiency, increase customer service

Another milestone in Barium's long-term policy of planned integration was reached recently with the consolidation of all steel-making operations under the management of Barium subsidiary Phoenix Iron & Steel Company, Phoenixville, Pa.

Aimed at improving efficiencies still further and broadening Barium's customer service, the consolidation integrates Central Iron & Steel Company, Harrisburg, Pa. (now known as Plate Division), Chester Blast Furnace, Inc., Chester, Pa. (now known as Blast Furnace Division), Structural Division, Phoenixville, Pa. and Phoenix Steel Tube Division, Phoenixville, Pa. (Seamless Tubing), under the management of Phoenix Iron & Steel Company. All now function as Operating Divisions, and will remain in their present locations.

Barium believes this merger will produce a stronger and more flexible operation and set the stage for accelerated growth—not only of the divisions directly involved, but also of the entire Barium organization. For this move is a practical demonstration of the alert management thinking which has expanded Barium from one company to 14 in ten short years. Find out about Barium's soundly diversified family of companies. Write for "The Barium Story." Barium Steel Corporation, 25 Broad Street, N. Y. 4, N. Y.

5.5

STEEL PRODUCERS

Phoenix Iron & Steel Co. (Plate Div.; Structural Div.; Steel Tube Div.; Blast Furnace Div.).

STEEL FABRICATORS & PROCESSORS

Phoenix Bridge Company • Industrial Forge & Steel, Inc. Globe Forge, Inc. • The Geometric Stamping Company

MANUFACTURERS OF END PRODUCTS

Clyde Iron Works, Inc. • Erie Bolt & Nut Company Bayonne Bolt Corporation • The Cuyahoga Spring Company • Jacobs Aircraft Engine Company • Kermath Manufacturing Company • Kermath (Canada) Limited Wiley Manufacturing Company.

LIGHTWEIGHT METAL AND PLASTICS

East Coast Aeronautics, Inc.

14
INTEGRATED COMPANIES
BARIUM
STEEL CORPORATION
WORKING IN STEEL, ALUMINUM, MAGNESIUM, FIBERGLASS

THE WORLD'S
Most Complete
REFRACTORIES SERVICE

HARBISON-WALKER
AND SUBSIDIARIES

Harbison-Walker

OPEN-HEARTH REFRACTORIES

help reduce steel-making costs

Open-hearth steel furnaces are industry's largest users of refractories. In these furnaces—in which by far the major portion of the world's steel is made—exceedingly severe and widely differing conditions call for refractories of highest quality and having particular combinations of physical and chemical properties. And here the use of Harbison-Walker products continues to reduce operating and maintenance costs.

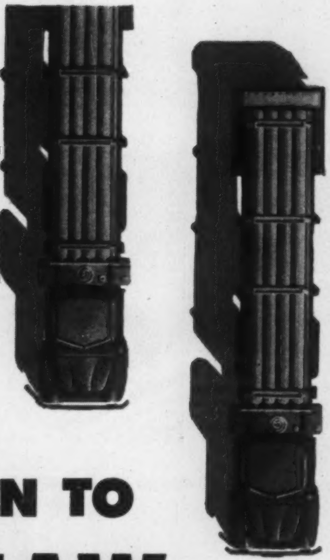
Among these refractories that give outstanding service are: H-W METALKASE, a metal-encased basic brick pioneered by Harbison-Walker; CHROMEX (chemically bonded) and CHROMEX B (extra hard fired) chrome-magnesite brick; STAR (conventional) and VEGA (the original super-duty) silica brick; H-W C MIX and H-W MAGNAMIX, superior monolithic materials for basic bottoms; FORSTERITE L and various other types and classes for regenerator checkers.

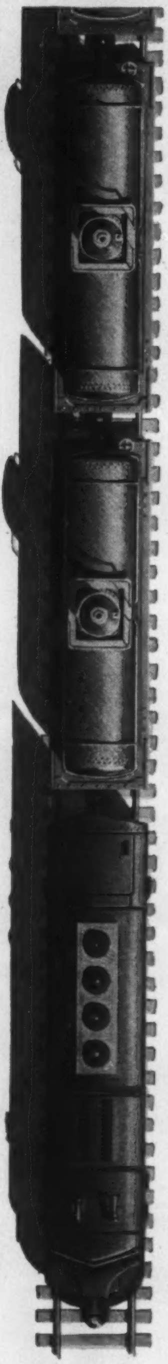
In addition, Harbison-Walker manufactures the full complement of types and classes of high alumina, fire clay and insulating fire brick, and the complete range of castables and plastic refractories for every application.

Technical service based on the most extensive experience and research is freely offered for assistance in determining the refractories best suited for each specific requirement.

REFRACTORIES COMPANY

World's Largest Producer of Refractories • General Offices—Pittsburgh 22, Pa.





IN ADDITION TO

HARSHAW

BORON TRIFLUORIDE

HYDROFLUORIC ACID

anhydrous . . . aqueous

Here are many more production-controlled, high-quality fluorides:

Ammonium Bifluoride
Ammonium Fluoborate
Antimony Trifluoride
  Sublimed
Barium Fluoride
Bismuth Fluoride
Boron Trifluoride
Boron Trifluoride
  Complexes
Chromium Fluoride
Copper Fluoborate
Fluoboric Acid
Fluorine Cells
Fluorinating Agents
Frosting Mixtures
Hydrofluoric Acid
  Anhydrous
Hydrofluoric Acid
  Aqueous
Hydrofluosilicic Acid
Lead Fluoborate
Metallic Fluoborates
Potassium Bifluoride
Potassium Chromium
  Fluoride
Potassium Fluoborate
Potassium Fluoride
Potassium Titanium
  Fluoride
Silico Fluorides
Sodium Fluoborate
Tin Fluoborate
Zinc Fluoborate
Zinc Fluoride

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Los Angeles • Hastings-on-Hudson, N.Y. • Philadelphia
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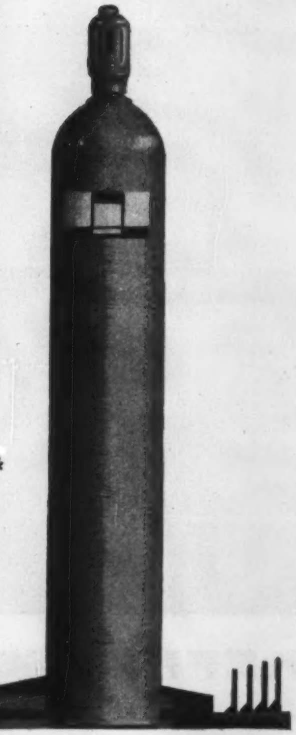
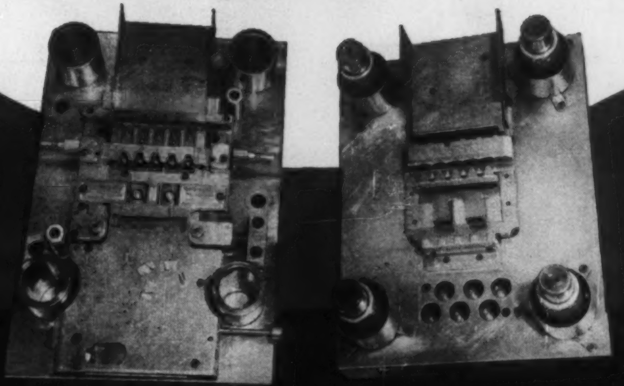
WRITE FOR

Harshaw's 40-page Book on Hydrofluoric Acid Anhydrous. It provides helpful data.



This Olympic FM DIE



produced 68,000,000 parts

. . . and ready for more!

Fisher Industries, Inc., Birmingham, Mich. used DESEGATIZED® Olympic FM die steel because . . .

1 Excellent wear resistance of Olympic FM extended the normal life of the die.

2 An estimated 25-30% savings in machining costs has been experienced with Olympic FM dies of this type.

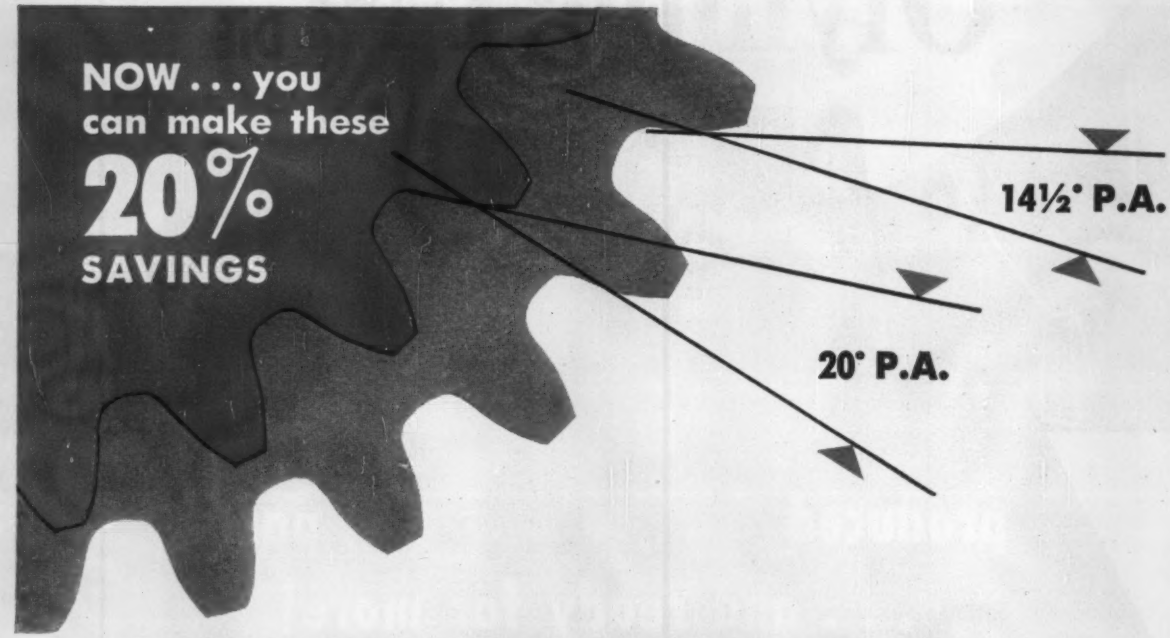
At Fisher Industries, Inc., Birmingham, Mich., the Olympic FM die (shown above) blanks and forms universal clips from .031″-.037″ zinc plated #4 Temper 1010 cold rolled steel. When photographs were taken, a total of 68,000,000 pieces had been produced on a press operating at 330 strokes per minute fabricating 5 clips per stroke.

Die makers and users throughout the metal-working industry have found that Latrobe's Olympic FM die steel consistently results in lower die production costs, superior machined finishes, and longer production runs than comparable type die steels. One of Latrobe's DESEGATIZED® steels, Olympic FM is a free-machining high carbon-high chromium die steel . . . the improved machinability characteristics resulting from the addition of alloy sulphides uniformly dispersed by the DESEGATIZED® process of manufacture.

For improved machinability and long production runs, order Olympic FM . . . Over 250 sizes are stocked in ten conveniently located warehouses.

LATROBE
STEEL COMPANY
Main Office and Plant
LATROBE, PENNSYLVANIA

Branch Offices and Warehouses in Principal Cities



NOW . . . you can make these

20%

SAVINGS

with 20° PRESSURE ANGLE GEARS

BOSTON GEAR now offers 441 Standard Stock Sizes

Every engineer knows the mechanical advantages of the 20° P.A. tooth form. It's the standard for automotive drives, and wherever highest efficiency, with economy of space, weight, and cost are essential.

Now, BOSTON GEAR has the answer to the question of *availability*. A full range of *standard stock* sizes, supplied by all BOSTON GEAR Distributors, makes it practical to specify the 20° P.A. for virtually all spur, bevel, and miter gear applications.

Start making this big saving you've been missing. For details, call your BOSTON GEAR Distributor, or write: Boston Gear Works, 73 Hayward St., Quincy 71, Mass.

SAVE 20%

IN SPACE, WEIGHT, AND COST

Example:

COMPARE: SAME RATIO SAME HP

	14½° P.A.		20° P.A.	
	Pinion	Gear	Pinion	Gear
Pitch Diam.	2"	8.4"	1.66"	7.00"
Center Distance	5.200		4.333	
Weight	1 lb.	7½ lbs.	¾ lbs.	5 lbs.
List Price	1.95	8.65	1.70	6.70

BOSTON GEAR CATALOG lists Standard Stock Sizes of 20° P.A. Spur, Bevel, and Miter Gears, along with the conventional 14½° P.A. Gears for every requirement. Ask for your copy.

Call your **BOSTON** *Gear*® **DISTRIBUTOR**

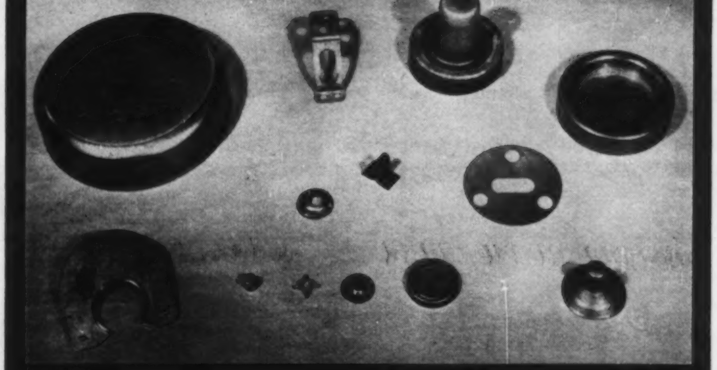
For nearest Distributor,
look under "GEARS",
in the Yellow Section
of your Telephone Directory

7124 "OFF-THE-SHELF" TRANSMISSION PRODUCTS FROM YOUR LOCAL DISTRIBUTOR — AT FACTORY PRICES

568G-G-18

MULTIPRESS

DRAWING KOVAR, a special alloy steel that's considered difficult to draw, is easy with this 35-ton Denison Multipress. And, set-up takes only a few minutes.



Some of the various electronic parts formed by Multipress at Amperex.

Quick die changes with **DENISON MULTIPRESS®** saves manhours

A way to cut costs on short-run metal-forming

SHORT RUNS, frequent die changes. That was the production problem at Amperex Electronic Corporation, Hicksville, New York.

Now, Denison hydraulic Multipress makes set-ups faster than possible with fixed-stroke presses. With Multipress inching control, the ram can be inched to the convenient point for attaching dies. And the smooth, variable hydraulic stroke gives set-up men perfect control of the ram.

Amperex uses three Multipresses for blanking, piercing, forming, drawing and broaching steel and nonferrous metals . . . to produce a wide variety of shapes and sizes.

This is one example among many where Multipress is cutting costs in the 1-to-75-ton pressure range. For help on your particular application, call a Denison Hydraulic Engineer.

**THE
DENISON ENGINEERING COMPANY**
1180 Dublin Road, Columbus 16, Ohio
A Subsidiary of American Brake Shoe Co.

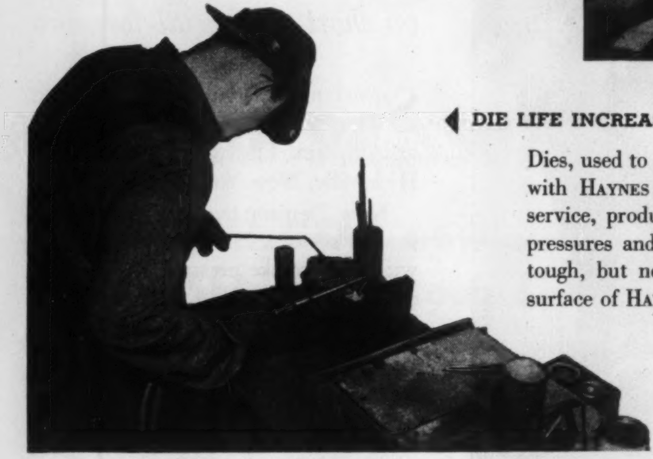
DENISON HydrOILics

HYDRAULIC PRESSES
PUMPS • MOTORS • CONTROLS

Hard-Facing Helped Here...it Can Help You Too!

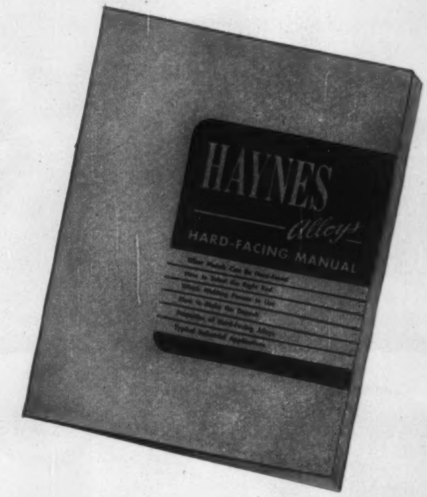
LIFE INCREASED 400% ▶

Hard-facing these entry guides with a wear- and heat-resistant Haynes Stellite alloy increases their service life from 4 to 5 times. Unprotected guides failed after handling only 40 tons of hot steel bars, while the ones protected with Haynes Stellite alloy handled up to 200 tons. The guides are subjected to continual abrasion and heat from the hot steel passing through them.



◀ **DIE LIFE INCREASED 500%**

Dies, used to shape refractory tile, last 5 times longer when hard-faced with Haynes Stellite alloys. Hard-faced dies have given 10 years' service, producing up to 500,000 tiles. The dies have to resist high pressures and abrasion from dry press operations. Unfaced dies are tough, but need the wear-resistance gained from a hard, protective surface of Haynes Stellite alloys.



AN ALLOY FOR EVERY JOB ▶

There are 14 different Haynes hard-facing alloys. Some are hard and abrasion-resistant, some are tough and ductile, capable of withstanding the shock of severe impact; others give extraordinary service under conditions of corrosion, erosion, and heat. Descriptions of each alloy and procedures for applying it are included in the booklet, "Haynes Alloys Hard-Facing Manual." Write today for your free copy.

HARD-FACE AND SAVE WITH

HAYNES *alloys*

Trade-Mark

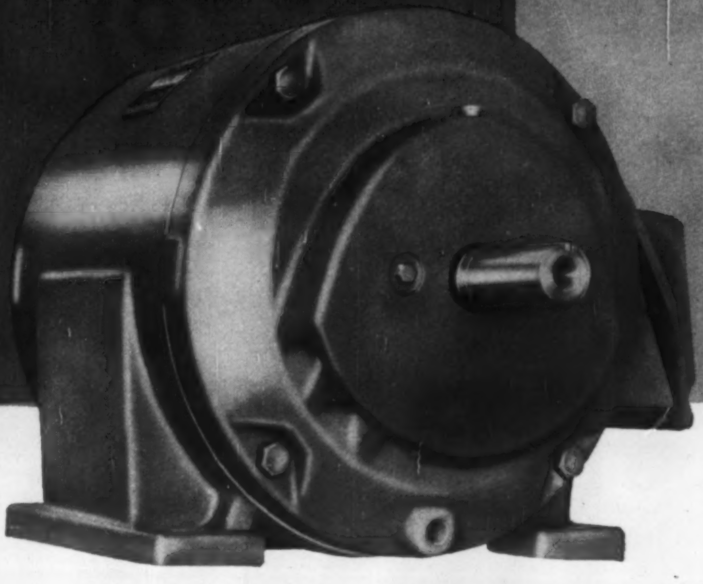
Hard-facing products made from cobalt-base alloys, nickel-base alloys, iron-base alloys, and cast tungsten carbide in the form of tube rods and coils.

"Haynes" and "Haynes Stellite" are registered trade-marks of Union Carbide and Carbon Corporation.

Haynes Stellite Company
A Division of
Union Carbide and Carbon Corporation
UCC
General Offices and Works, Kokomo, Indiana
Sales Offices
Chicago — Cleveland — Detroit — Houston
Los Angeles—New York—San Francisco—Tulsa

Totally Protected

FROM
CORE
TO
COVER



RELIANCE
Totally-Protected
MOTORS

The total protection concept of design and construction armors Reliance A-c. Motors against everyday hazards, with little or no maintenance. Total protection is made up of extra features like:

Slot cell insulation of Double Backed Mylar

Dynamically balanced rotor for vibrationless operation

Entire insulation system impervious to acids, moisture and oils

Metering plate regulates grease flow to bearing

Ventilation louvres positioned high and dry in end brackets

There are 100 of these extra core to cover protection features in Reliance Motors. Each point is covered in our bulletin, "Check the 100 Facts". Why don't you write for one and get all the details? B-1510

RELIANCE ELECTRIC AND ENGINEERING CO.

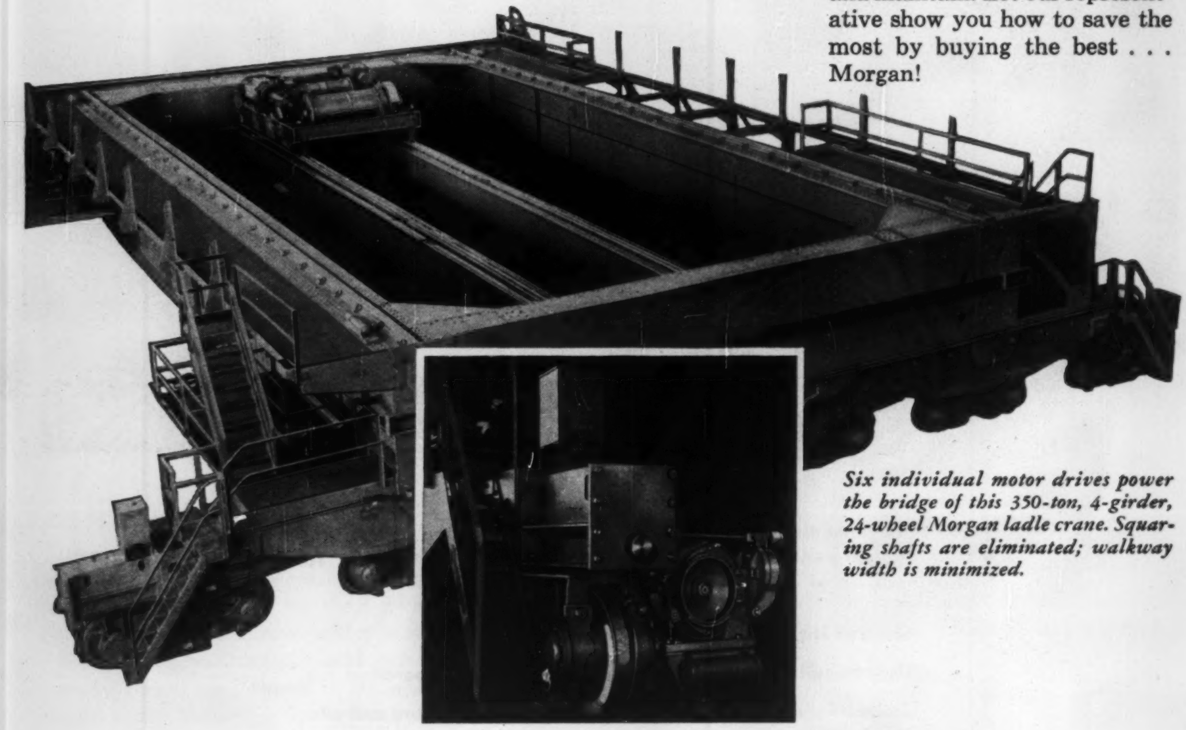
Cleveland 10, Ohio • Offices in Principal Cities
Canadian Division: Welland, Ontario

How Morgan "points the way" to smoother crane operation

● **INDIVIDUAL MOTOR DRIVES** were pioneered by The Morgan Engineering Company to improve crane bridge travel . . . to provide smoother operation, to reduce the number of moving parts, to simplify maintenance, to eliminate dead weight of drive shafts, to streamline the crane.

These individual motor drives are another vital link in the chain of features that make Morgan cranes the best in the business.

Performance records prove that advanced design and heavy-duty construction of Morgan cranes make them less costly to operate and maintain. Let our representative show you how to save the most by buying the best . . . Morgan!



Six individual motor drives power the bridge of this 350-ton, 4-girder, 24-wheel Morgan ladle crane. Squaring shafts are eliminated; walkway width is minimized.

The Morgan Engineering Company, founded in 1868, manufactures overhead electric traveling cranes, gantry cranes, charging machines, plate mills, blooming mills, structural mills, shears, saws, and auxiliary equipment.

THE MORGAN ENGINEERING CO. Alliance, Ohio

IF YOU MAKE *Springs*

YOU'LL DO BETTER WITH ROEBLING

ROEBLING makes high carbon steel spring wire and flat spring steel... and makes it *better*... for every sort of spring and for every product that requires spring characteristics. Hard drawn, hard rolled, annealed or soft, tempered or untempered ... they're all available to meet your requirements exactly.

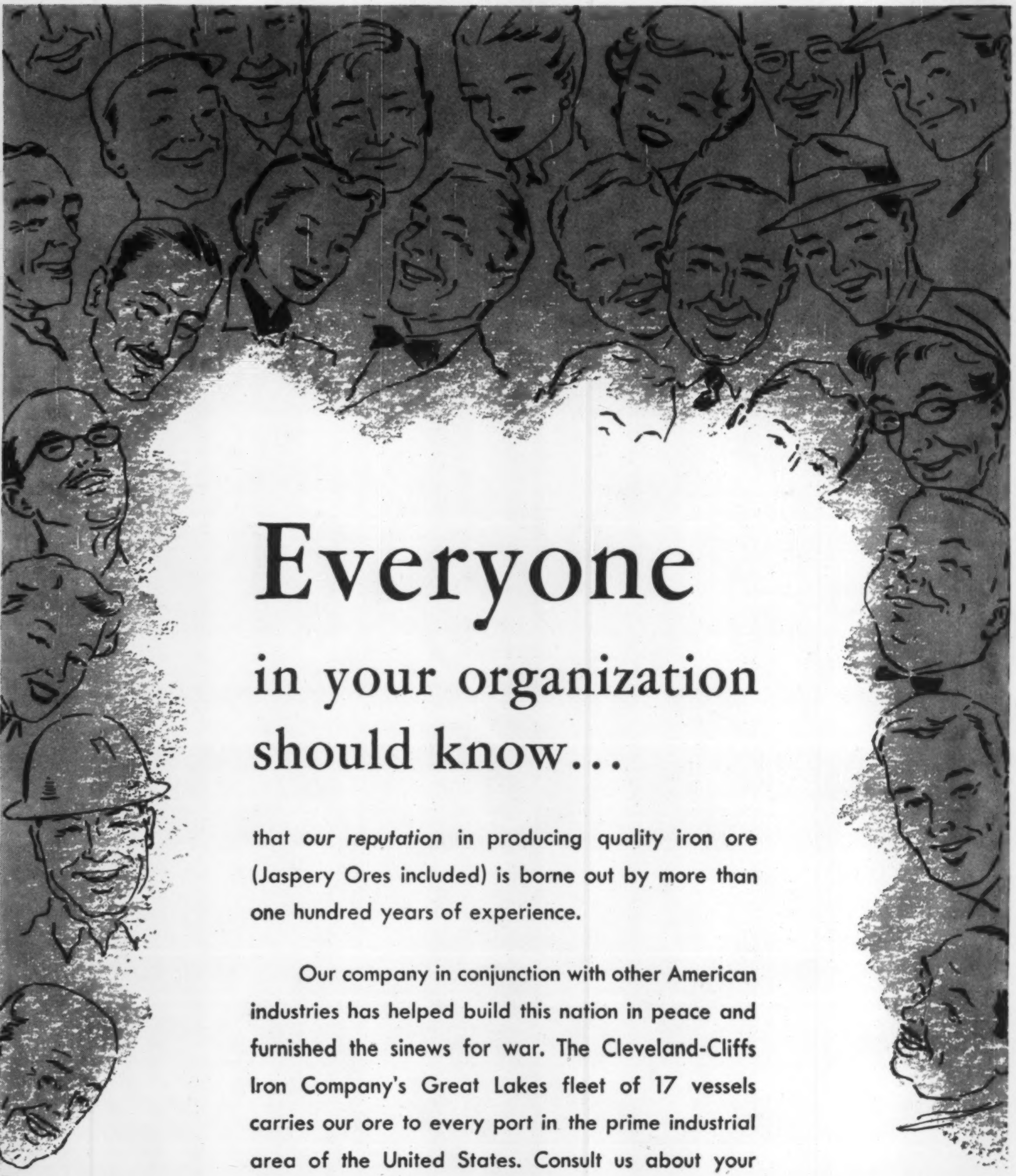
Among these Roebling materials are zig-zag and no-sag wires; mechanical and valve spring wires; music wire; clock and motor type spring wires; flat spring steel and upholstery spring wire of all types. The variety of parts into which these are formed is almost endless, but manufacturers all report that Roebling quality and uniformity reduce machine downtime.

Learn for yourself how Roebling can help your production and product. John A. Roebling's Sons Corp., Trenton 2, N. J.

ROEBLING CF&I

Subsidiary of The Colorado Fuel and Iron Corporation

ATLANTA, 934 AVON AVE. • BOSTON, 51 SLEEPER ST. & 5 PITTSBURGH ST. • CHICAGO, 5525 W. ROOSEVELT RD. • CINCINNATI, 3253 FREDONIA AVE. • CLEVELAND, 13225 LAKEWOOD HEIGHTS BLVD. • DENVER, 4801 JACKSON ST. • DETROIT, 915 FISHER BLDG. • HOUSTON, 6216 NAVIGATION BLVD. • LOS ANGELES, 5340 E. HARBOR ST. • NEW YORK, 19 RECTOR ST. • ODESSA, TEXAS, 1920 E. 2ND ST. • PHILADELPHIA, 230 VINE ST. • ROCHESTER, 1 FLINT ST. • SAN FRANCISCO, 1740 17TH ST. • SEATTLE, 900 1ST AVE. S. • ST. LOUIS, 3001 DELMAR BLVD • TULSA, 321 N. CHEYENNE ST. • EXPORT SALES OFFICE, 19 RECTOR ST., NEW YORK



Everyone

in your organization should know...

that *our reputation* in producing quality iron ore (Jaspery Ores included) is borne out by more than one hundred years of experience.

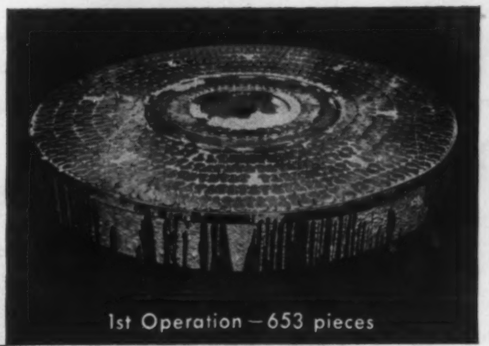
Our company in conjunction with other American industries has helped build this nation in peace and furnished the sinews for war. The Cleveland-Cliffs Iron Company's Great Lakes fleet of 17 vessels carries our ore to every port in the prime industrial area of the United States. Consult us about your Ferro Alloys and Coal Needs.

IRON ORE ★ ALLOYS ★ VESSEL TRANSPORTATION ★ COAL

The Cleveland-Cliffs Iron Company

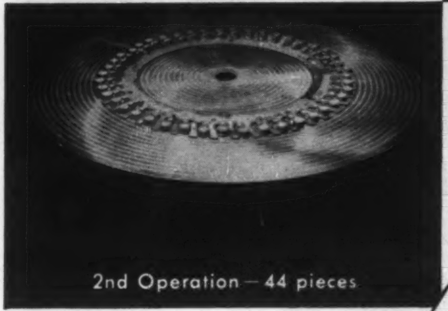
UNION COMMERCE BUILDING • CLEVELAND 14, OHIO

Another example



1st Operation — 653 pieces

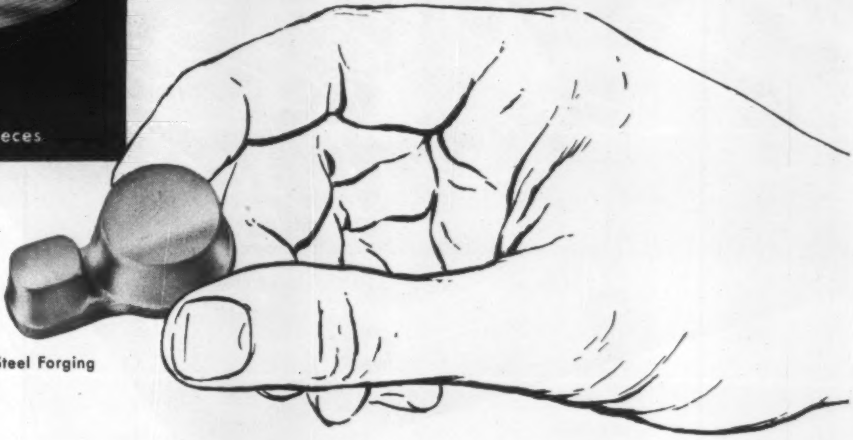
W-1138



2nd Operation — 44 pieces

W-1139

# of Blanchard versatility



No. 303 Stainless Steel Forging

653 oddly shaped, non-magnetic workpieces

Blanchard Surface Grinders are noted for their unusual versatility—like grinding small, non-magnetic stainless steel forgings in quantity.

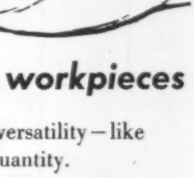
In the first operation, 653 forgings are loaded and blocked between rings on a No. 18 Blanchard, with 36" magnetic chuck (stock removal .010"). Parts, chuck and rings are sprayed with oil, and molten sulphur is poured around the parts to hold them. After grinding, the sulphur is easily stripped away.

This entire operation takes only 1½ hours—including preparation of the sulphur.

In the second operation, 44 pieces are set in a notched steel ring. Tilting the wheelhead and maintaining wheel pressure in one direction holds these non-magnetic pieces in the notches. Stock removal from this surface is .030", to tolerance of ±.003. Each load takes eight minutes—floor-to-floor.

As a result of this ingenious workholding, each piece is ground on both sides in a fraction of a minute, at less than 98¢ abrasive cost for all 653! That's typical of the convenience and economy of grinding on a Blanchard—whether the parts are magnetic or non-magnetic!

Send for free copies of "Work Done on the Blanchard", 4th edition, and "The Art of Blanchard Surface Grinding", 3rd edition—recently revised.



PUT IT ON THE BLANCHARD

THE BLANCHARD MACHINE COMPANY **64 STATE ST., CAMBRIDGE 39, MASS., U.S.A.**

What's Ahead in Steel Service

Many new products and service facilities have been added at Ryerson during the past few months. Many more are in prospect for '56. Here's a review and a look ahead:

NEW STEELS—Three new Ryerson leaded alloys—Rycut 20, Rycut 40 and Rycut 50, were introduced during the past year. Additional sizes of these amazingly fast-cutting alloys have recently been added to our stocks—further additions are in store. Leaded plates, available only at Ryerson, have just been introduced and these New E-Z-Cut plates soon will be on hand in larger tonnages. Other recent additions to Ryerson stocks: Stainless plates and sheets in extra large sizes, welded pump-cylinder tubing, mansard pattern siding in stainless, galvanized and carbon steel, 8615 alloy steel plates for case hardening applications.

NEW SERVICE FACILITIES—Ryerson service facilities are never completed—modernization and expansion go on continuously. A few 1955-56 examples: a brand new Connecticut plant, additional facilities doubling stock and service capacity at Boston, a 30% increase in facilities at Buffalo, new cut-to-length lines at New York and Boston, greatly augmented shearing equipment at Chicago, more plant area at Los Angeles, Detroit and Spokane.

NEW QUALITY PROTECTION—Now, in 1956, still more stringent quality controls are going into effect—giving you added assurance of predictable steel performance every time. And these new controls supplement an existing program of quality checks and counter checks already considered exceptional throughout the metal-working industry.

STEPPED-UP DELIVERIES—Even under the pressure of current demand, a high per cent of all regular orders for steel from stock are shipped within 24 hours—practically all within 48 hours. With expanded facilities we confidently expect to do even better in 1956!

You have helped to make 1955 another year of great progress for Ryerson. We believe we can best show our appreciation by continuing to improve our ability to serve you in the year ahead.

RYERSON STEEL

In stock: Bars, structurals, plates, sheets & strip, tubing, alloys, stainless, reinforcing, machinery & tools, etc.

JOSEPH T. RYERSON & SON, INC. PLANTS AT: NEW YORK • BOSTON • WALLINGFORD, CONN. • PHILADELPHIA • CHARLOTTE, N. C. • CINCINNATI CLEVELAND • DETROIT • PITTSBURGH • BUFFALO • CHICAGO • MILWAUKEE • ST. LOUIS • LOS ANGELES • SAN FRANCISCO • SPOKANE • SEATTLE

Metalworking Outlook

Business Climate for 1956

Watch three danger points in the economy which could tarnish metalworking's bright business prospects for 1956. They're credit, auto sales and inventories. Total consumer credit outstanding at the end of October hit a peak of $34.9 billion, compared with $29 billion a year earlier. It's not alarmingly high, but it could become that way quickly. Sales of 1956 model autos have been far from sensational, and dealer stocks are conservatively estimated at 700,000, which is high. Significantly, auto companies will spend 30 per cent more on 1956 model promotion than they did on 1955 units. Industrial and consumer durable inventories will climb steadily for the first half to such an extent that a sharp inventory adjustment is possible in the second half.

Indicators: All Going Up

Despite those danger spots, industry thinks chances are good for another phenomenal year. GNP should hit $400-$403 billion, compared with the record $387.7 billion in 1955. The Federal Reserve Board's industrial production index should average about 144 or 145, 4 to 5 per cent above 1955. The general price level will climb 2 or 3 per cent, but industrial quotations will jump as much as 5 per cent, as farm and food drop or remain static. Metalworking profits in 1956 will be about the same as last year.

Metalworking Sales at $138 Billion

Metalworking sales in 1956 may reach $138 billion, compared with an estimated $128 billion for 1955. The poorest quarter will be the third; the other three should be about on par. Steel production for the coming 12 months will depend partly on the outcome of labor negotiations. We'll have the capacity to make 127.5 million tons, and will produce at an annual rate of 120 million in the first half. But the third quarter will be off, strike or no strike; so the second half may not match the first half. If 1956 ingot production exceeds the 1955 record of 117 million tons, it will do so by only a hair.

Industry-by-Industry Prospects

Steel-consuming industries will fare about this way:

CONSTRUCTION—This perennial record breaker will continue its front-running ways, despite an expected drop in housing starts from 1,320,000 in 1955 to 1.2 million in 1956. Big gains will come in industrial, com-

Forum on Technical Progress—p. 195 Market Outlook—p. 459

mercial and institutional building to push construction totals to $44 billion, compared with $42 billion last year.

TRANSPORTATION EQUIPMENT—Declines in automobiles will be offset by big increases in railroad buying and modest gains in aircraft and shipbuilding. Look for 7 million autos to be assembled in the U.S. during the next 12 months. The 1957 models—many to be introduced next August and September—will account for a substantial volume. Railroad equipment expenditures may exceed $1 billion this year, compared with $800-million-plus in 1955. Freight car production alone will reach 70,000, 85 per cent higher than in 1955. Sales of the 12 largest aircraft manufacturers could soar to $5 billion, compared with $4.94 billion in 1955 and $4.92 billion in 1954. Unit deliveries will be down, but the units will be more complex, especially guided missiles. A U.S. aid program will help shipbuilding.

APPLIANCES—Unit sales in the coming 12 months will be up 10 per cent from 1955. Hottest seller will be the automatic clothes dryer. All major products will gain, except electric refrigerators and freezers, which should hold their own. Trends: More independents will join forces to introduce full lines; color will continue to make its mark; built-in appliance lines will commence to take a larger piece of the sales dollar.

MACHINERY—1956 deliveries will be up 15 per cent over 1955's. Machine tool shipments will reach $800 million, compared with $660 million in 1955. In effect, machinery will be getting in 1956 what most of industry had in 1955. Machinery sales last year were not outstanding.

ELECTRICAL MACHINERY—The same is true in the area of electrical units. Look for a 10-per-cent gain here. Sales of electronic apparatus will supply most of the rosy glow. Capacity to produce generating equipment will be filled, but profit margins are unexciting.

FARM EQUIPMENT—Farm incomes will be down 4 to 5 per cent, but it's possible that equipment sales will hold at 1955's unexceptional levels. Farmers know they must mechanize to prosper. The industry did a business of nearly $1.5 billion last year, compared with $1.4 billion in 1954, $1.6 billion in 1953 and $2 billion in 1951.

OIL AND GAS EQUIPMENT—Watch for another 5-per-cent gain, led by the ever expanding sales of pipe and apparatus for pipelines. Between 55,000 and 56,000 new wells were drilled last year, a record. At least as many are expected to come in during the next 12 months. Well drilling—both in number and in depth—will increase steadily for the next two decades. By 1975, it won't be unusual to be drilling 80,000 new wells a year.

CONTAINERS—Here's one of the steadiest industries in the U.S. Manufacturers in 1955 saw a 10-per-cent jump in business over 1954's. But 1956 may return to the normal annual increase of 4 or 5 per cent over the preceding year. Largest gains in can use should come in soft drinks as beverage quality improves.

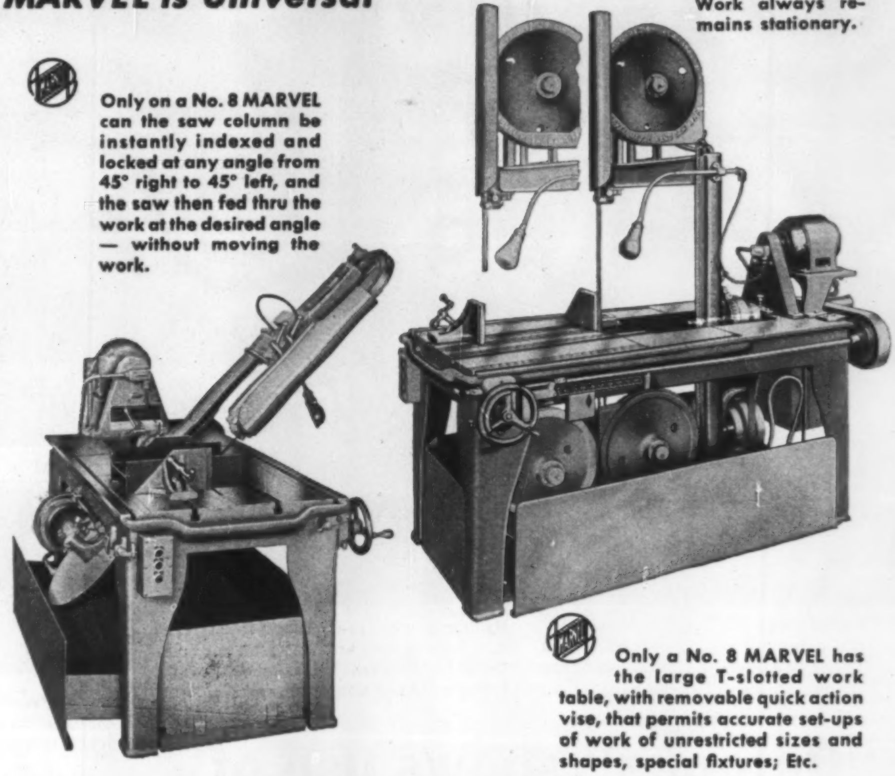
Never Confuse the No. 8 MARVEL with an ordinary Band Saw

...only the MARVEL is Universal

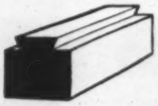
Only on a MARVEL No. 8 does the blade remain at a right angle throughout its full 18" feed traverse. Work always remains stationary.

Only on a No. 8 MARVEL can the saw column be instantly indexed and locked at any angle from 45° right to 45° left, and the saw then fed thru the work at the desired angle — without moving the work.

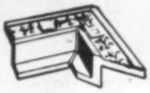
Only a No. 8 MARVEL can do all of these things: Snip-off a ⅛" rod or cut-off an 18" x 18" cross section



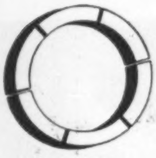
Only a No. 8 MARVEL has the large T-slotted work table, with removable quick action vise, that permits accurate set-ups of work of unrestricted sizes and shapes, special fixtures; Etc.



Rough to Size and Shape



Miter



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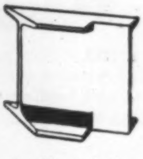
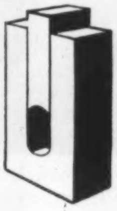


cut off and shape Structural Beams.



"Rough Machine" to size and shape with minimun chip waste

The No. 8 MARVEL is the "busiest tool in the shop" wherever installed because it is a *universal* tool—has both the capacity and the versatility to handle not only standard sawing jobs but innumerable "trick" and convenience jobs as well. More than a metal saw, the No. 8 MARVEL is a fine machine tool with machine tool features like: Both power and hand feeds; Depth Stops; Automatic Blade Tension; Built-in Coolant Pump; Three operating speeds (or six with 2-speed motor). Moisture-proof electrical controls that conform to both "J.I.C." and "MACHINE TOOL" electrical standards; Dirt-proof ball bearings, etc.

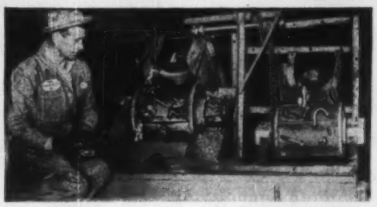
If you cut, machine or fabricate metal, this is a sawing machine you should know about. Write for catalog.

MARVEL *Metal Cutting* **SAWS**

Better Machines—Better Blades

ARMSTRONG-BLUM MFG. CO. • 5700 West Bloomingdale Avenue • Chicago 39, U.S.A.

9½ Pound Magnetic Octopus, about 12" square, primarily designed for dip tank use in hot or corrosive liquids, as shown. Utilizing Alnico magnets in 3 small stainless steel (18-8) tubes, it retrieves tools, tramp iron and tiny iron particles from hard-to-reach bottoms of ovens, troughs, tanks and other vessels.



Better Product Assured where Eriez permanent magnetic drums remove stray iron from tallow and meat scraps.

"Octopus" shows use of magnetic nickel alloy for diverse application

THIS MAN HOLDS a deceptively simple Eriez tool, well-named a magnetic "Octopus."

It is completely non-electric. Yet its powerful, permanent magnetic strength is capable of lifting and holding sizable amounts of ferrous metal objects or masses.

This potent, permanently dependable magnetic power stems from ALNICO . . . an aluminum-nickel-cobalt-iron alloy.

The remarkable permanent magnetic strength of this nickel alloy provides two basic advantages:

(1) **No need for electromagnets, current and accessory equipment.**

(2) **Reduction of tool size and weight to desirable limits.**

These are utilized in tools made by Eriez Manufacturing Company, Erie, Pa. for hundreds of diverse applications.

The addition of nickel... essential in Alnico permanent magnets . . . helps scores of other alloys meet particular fabrication and service demands. So if you encounter difficulty with metal for a specific application, let us give you some practical help. Write for . . . List A of available publications. A simple form makes it easy for you to outline your problem.

Safeguards Hammer Mill. Eriez non-electric magnetic pulley removes tramp iron from wood chips on belt feeding the mill and explosive mixtures beyond.

Cleans Powdered Chemicals. Eriez permanent magnetic grate removes invisible iron particles from drugs and the like.

INCO

THE INTERNATIONAL NICKEL COMPANY, INC. 67 Wall Street
New York 5, N. Y.

January 2, 1956

Guideposts for '56

Like most executives in business and industry, you probably are busy reexamining and realigning your plans for 1956.

It's a task complicated by the necessity to plan for next year, plus the next five, ten or fifteen years. Horse-and-buggy thinking can't keep up in this supersonic age.

Forward thinking need not be blind flying, though. Informed management takes advantage of the modern methods of forecasting. You'll find an example of such a forecast in this issue of Steel. It reports that metalworking executives as a group look for their business volume to increase 8 per cent in 1956 over 1955. The second half, they forecast, will be slightly better than the first half. For the year, metalworking volume will be a record $138 billion.

There would appear to be few problems other than listening to the merry whir of automatic accounting machines recording new highs in sales and profits. Nothing could be farther from the truth. There will be plenty of problems. These areas, metalworking executives predict, will require constant surveillance in making plans:

Capacity: Do you have enough to meet the needs of a mushrooming population? Is it strategically located, with the drift to the South and West in mind?

Equipment: Are the machines for making and handling your products efficient?

Materials: Have you checked on the new and improved metals, alloys and finishes available in forms and shapes that save materials and cut costs?

Technical Advances: Do you know about all the new cost-cutting methods and processes arriving on the scene almost daily?

Cost Control: Are you employing methods, such as value analysis, to find out where you really stand on costs?

Manpower: Will you need more workers? Are present employees in the jobs for which they are best suited?

Wages: Are you ready to cope with labor's all-out demands for more pay and fringe benefits and Supplementary Unemployment Pay?

Markets: Are you prepared for shifts in your markets, the appearance of new competition? Are you searching hard enough for new markets? Are you getting your share of expanding defense and export business?

Prices: Are you permitting your sales organization to "get the order" without regard to costs and profit margins?

In an era of apparent prosperity and high-volume business, 1956 will be a year of intense competition and pressures on every front. The difference between poor planning and good planning can be the measure of failure or success.

Irwin H. Such

EDITOR

THE ICEMAN GOETH . . .
Ever stop to reflect on how American traditions are being quietly but constantly removed from the scene by progress? The iceman, for instance. In our day, the development of modern refrigerators and more than a hundred other household appliances has made life a great deal more pleasant. A vigorous and imaginative appliance industry has emancipated us from household drudgery.

New and better steels have played their part in this evolutionary process. And here at Inland, we've been pleased to work closely with appliance manufacturers, over the years, to provide the *right* steels for their products.

INLAND STEEL COMPANY *38 South Dearborn Street, Chicago 3, Illinois*
Sales Offices: Chicago, Milwaukee, St. Paul, Davenport, St. Louis, Kansas City, Indianapolis, Detroit, New York • Steel products supplied to the appliance industry include hot and cold rolled sheets and strip, enameling iron sheets, electrical sheets, Ti-Co galvanized sheets, tin plate, black plate, bars. Other products: plates, structurals, 4-Way safety plate, reinforcing bars, rails and track accessories, coal chemicals.

INLAND

Expansioneering

How To Plan Your Growth

METALWORKING, having chalked up a record year in 1955, hardly is pausing to count its gains. The industry is moving toward still higher production in 1956, and possibly a whole series of new marks in the ten or fifteen years ahead.

To those who take a glance backward, the accomplishments of 1955 are impressive.

Manufacturers' sales in metalworking rose to $128 billion, a gain of 20 per cent over 1954 and $6 billion greater than in the previous peak year, 1953.

Steel output rose to 117 million tons, almost 6 million tons more than in 1953.

Automobile assemblies rose to 8 million passenger cars, 1.4 million more than the previous high in 1950.

Electricity output rose to 540 billion kilowatt-hours, compared with 471 billion in 1954.

Gross national product rose to $387 billion, compared with $364 billion in 1953.

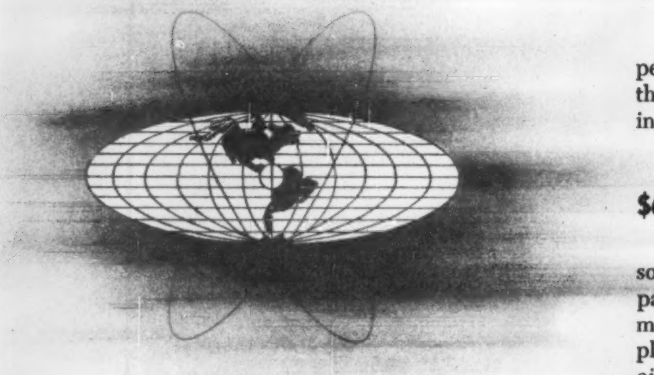
Employment rose to more than 65 million, and the wages were the highest ever paid.

But the records of 1955 simply establish a new bench mark by which to measure future gains. You who manage metalworking expect your sales to rise 8 per cent this year. You intend to increase your employment, although you don't know where skilled workers are coming from. You are going to build new plants, expand present ones and install new, more efficient machinery and equipment on a scale never before equaled.

New Expansion Slope

We are starting up a new expansion slope. The plans for growth are not only for 1956 but often are projected for five, ten and even fifteen years.

Steel producers will increase their capacity 50 per cent by 1970. Aluminum producers will more than double facilities in the next fifteen years. Auto companies will spend billions for new plants. Other metalworking companies will be building comparable facil-



ities to transform the increased output of basic materials into the end products demanded by an upsurging population.

This year's expenditures for new plant and equipment already planned will be $31 to $32 billion. The figure may be higher. Industry has a way of exceeding its own estimates.

Engineered Expansion

The expansion you are planning will be greater than that of the war years or the early postwar era. It's also a different kind of growth. The wartime and postwar expansions were emergency moves, designed to get out production as quickly as possible and often without too much thought as to their ultimate use. The present building is being more carefully planned. It is being fitted to carefully appraised needs for future years.

Dynamic Economy

What is behind the great push toward more capacity, more production and plans for still more expansion?

The most common answer is population growth. That is only part of the answer. India and China both have far more people than the U. S. If number of people alone could provide markets, what a market the Orient would be.

Obviously, it takes more than numbers. And we have what it takes: An expanding population that is demanding more goods, plus a fabulous industrial machine that can produce them.

Grandmother kept her food cool in the cellar; mother had an ice box; and daughter has a refrigerator and probably a freezer. To father, air conditioning meant opening the window. Son wants mechanical air conditioning in his office and his home.

Such a climate of well-being has made for a high-compression economy capable not only of vast total expansion but of continuing expansion of per capita consumption.

In 1900, steelmaking capacity of 556 lb per capita was adequate. Today's capacity is three times that, and consumers are complaining of the steel shortage!

$64 Billion Question

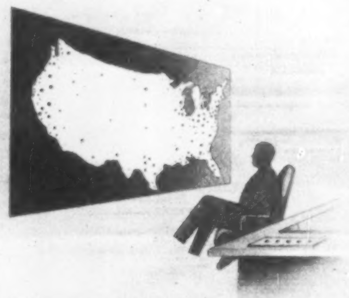
Major steelmakers have announced or soon will announce tremendous and costly expansion programs. While company presidents make public the ambitious projects to be completed in the next two or three years, their aides are busy in the back rooms drafting new expansion plans. Some will be unveiled before current programs are completed.

It sounds too good to last. Are we in danger of overbooming the boom?

There are good reasons to believe that we are making good progress toward depression-proofing the economy. Certainly, there will be readjustments and rolling recessions, but the prospects for fairly steady, medium-term growth never have been brighter.

Diversity Helps

One reason for confidence is our increasing diversification. If one industry falters, others pick up the slack, and the economy continues to move forward. This year, for example, the auto industry and the home building industry expect a lower volume than in 1955.



The transportation industry as a whole will move forward, with railroads and pipelines offsetting the decline in auto production.

Construction will move forward to a new record. Industrial, commercial, institutional and highway construction will more than offset the slight decline in home building.

Technological Research

Growing activity in technological research and development is another reason for confidence. The number of people in technological research today is 50 per cent greater than at the end of World War II. They have better tools with which to work. They are bringing forth new processes which increase productivity. They are creating new products for which a demand is quickly created.

Scientific Management

Another dramatic cause for our economic growth is the emergence of scientific management. No longer do industrial managers "fly by the seat of their pants." As Larry Appley, president of the American Management Association, puts it: "The scientific manager plans what he is doing, studies what he is doing, measures what he is doing, compares it with experiment and experience and conscientiously anticipates how he can do it better."

Unlike Topsy

Today's economy is not "just growing." It is experiencing a planned, dynamic growth. It is being expansioneered.

Management is recognizing that vast and rapid growth introduces new problems—in physical building, in marketing, in product development, in human relations—in fact, in all areas of management.

Some of the problems arising from metalworking's impressive expansion will be explored in this publication's Program for Management—1956. The series will cover:

It's Time To Grow

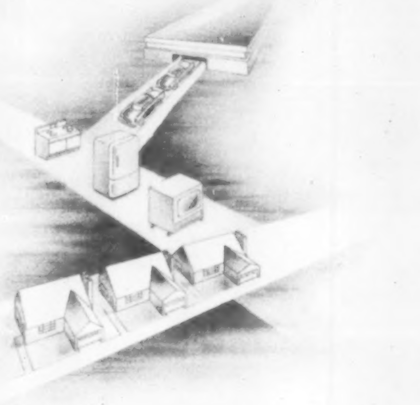
The expanding economy means most of you will be concerned with expansion over the next few years. Many of you will build brand new plants. Many of you will enlarge present facilities. Practically all of you will make substantial investments in new equipment.

The questions—when to start, where to locate new facilities and how much to build and to spend—will be vital. Starting too late may mean a loss of participation in growing markets. Building too much or too little can be costly. Shifts in markets, in labor supply and in raw materials sources must be considered in locating productive facilities.

To Merge or Not To Merge

That really is the question for hundreds of metalworking companies. Merging can mean greater opportunity, or it can mean oblivion. It may be a quick way to expand or to diversify. It may be the best way to acquire management talent, established products, distribution and sales outlets. It may strengthen your over-all competitive position.

But merger brings lots of knotty problems. The most immediate may be legal and tax angles. The most important may be those of personnel.



Know Your Costs

Throughout the postwar boom, companies and entire segments of the metalworking industry have been operating at a profit level that is too low. Price wars have been common. Among others, power generating equipment, domestic heating and wire rope people have been selling too close to, or below, the profit line. Why?

The major cause is an ignorance of true costs. This knowledge will not come from better cost accounting alone. Needed first is a cost detection drive led by a top executive. It must be followed by an educational program to teach the economic facts of life to management down through the foreman level.

It's a never-ending task. In these days of expansion, your cost picture is changing constantly. Your pricing judgment will be only as good as your cost information.

Metalworking Goes to Market

We have mass production but not mass distribution in metalworking. That may be limiting our growth far more effectively than materials shortages, insufficient capital or any of the other more frequently mentioned bugaboos.

Can industrial products be mass distributed like tooth paste or Fords?

Industry, of course, will never sell machine tools through the A&P or even through 100,000 dealers across the country. But it can develop its own version of the supermarket.

A new look at selling techniques is in order. Emphasis has been largely on increasing the efficiency of production. It is time to focus equal attention on distribution.

Motivating Men To Produce More

Every management man is conscious of the rather wide variation in the productivity of individuals. Moreover, wide variations in productivity show up within departments, plants and even companies.

Are the variations due to communications, working climate or some other factor in incentive?

We know too little about the causes and remedies for low productivity.

How To Live with SUP

Last year saw the beginning of acceptance of the idea. The issue will be the big one in many 1956 bargaining negotiations. Many believe the principle of Supplemental Unemployment Pay will be extended.

Will SUP be regarded solely as an additional burden on management? Or can we convert it into a benefit? Union leaders contend that unemployment compensation should supply a strong economic incentive for regularizing production and employment. Some industry men believe that leveling out production more evenly is the next big area for exploration.

Automation—Bogeyman or Bonanza?

Does automation kill or create jobs? While metalworking men investigate the possibilities of developing automatic operations in their plants, they are largely silent on its social aspects. Labor spokesmen are highly critical.

A courageous approach to social and economic aspects of automation is in order. Where temporary displacement of workers results from automatic installations, industry needs to do all in its power to alleviate the situation. At the same time, the benefits of automation—in creating new industries, in providing more goods for more people at less effort, in easing the burden on workers—should be frankly appraised.

Ideas for Industry

A common self-criticism by the industrial executive is that he, like other people, tends to think in terms of past problems and solutions.

New problems, such as are being presented by our huge expansion, call for new thinking.

A technique winning enthusiastic reception among forward-looking management men offers a way to unlock idea resources among your people. It is disciplined creative thinking. It is "brainstorming." Properly used, it can give you newer, better ideas. Your competitors will be using it. Shouldn't you?

Aid from—and to—Colleges

You have been competing vigorously for an inadequate supply of trained engineers. To a less publicized extent, you are competing just as vigorously for well-trained men in every category.

At the same time, industrial companies are being called upon to give more aid to colleges and universities.

Here is an area for co-operation between business and schools. The benefits: Educational institutions will get greater financial support. Industry will get better-trained men.

New Horizons for Metalworking

Fifty years ago the railroads were the big market for the metalworking industry. Then came the automotive industry. Other industries—aircraft, electronics—have moved up.

A few years ago, atomic energy was primarily a government project. Civilian applications were thought to be far away. But the atomic age came faster than we expected.

Other technological developments constantly are promising larger markets and are offering new opportunities.

We're living in a many-splendored economy.

• Extra copies of this article are available in quantities from one to three until supply is exhausted. Write Editorial Service, STEEL, *Penton Bldg.. Cleveland 13, O.*

STEEL
JANUARY 2, 1956

What Metalworking Management Expects in 1956 . . .

A WHOLE series of records—in production, sales volume, employment—is in the making.

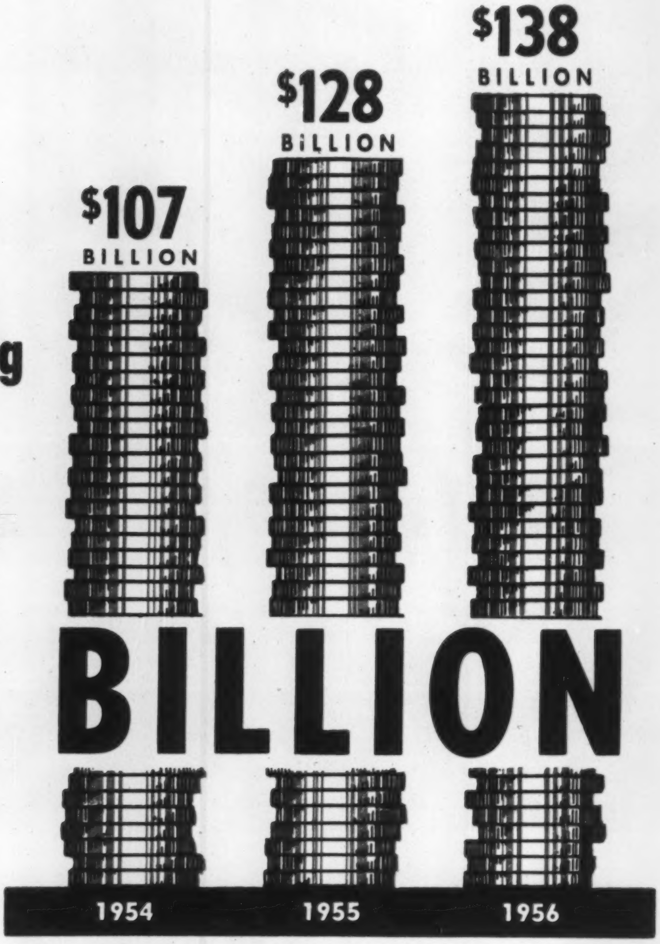
There will be problems. Foremost will be a scarcity of materials. A little hesitancy due to political uncertainties may appear, but it will be brief. Foreign competition in certain lines will continue keen. A few companies will have a lower volume.

But the industry as a whole will enjoy its biggest year. That's what respondents to STEEL's annual survey expect in 1956.

Extra copies of this survey are available in quantities from one to three until supply is exhausted. Write Editorial Service, STEEL, Penton Bldg., Cleveland 13, O.

- **Sales will rise to new record**
- **Employment will be higher**
- **Skilled workers will be scarce**
- **Selling prices will go up**
- **Manufacturing costs will climb**
- **Expansion will accelerate**
- **More new products will appear**
- **Defense output will hold**
- **Sales forces will be strengthened**

1956 Metalworking Dollar Volume Expected to Reach $138 BILLION



METALWORKING production and sales will move into new high ground again this year. Dollar sales will be up 8 per cent from the $128-billion record established in 1955.

Employment, selling prices and manufacturing costs will edge upwards. The inflationary bias will be more pronounced.

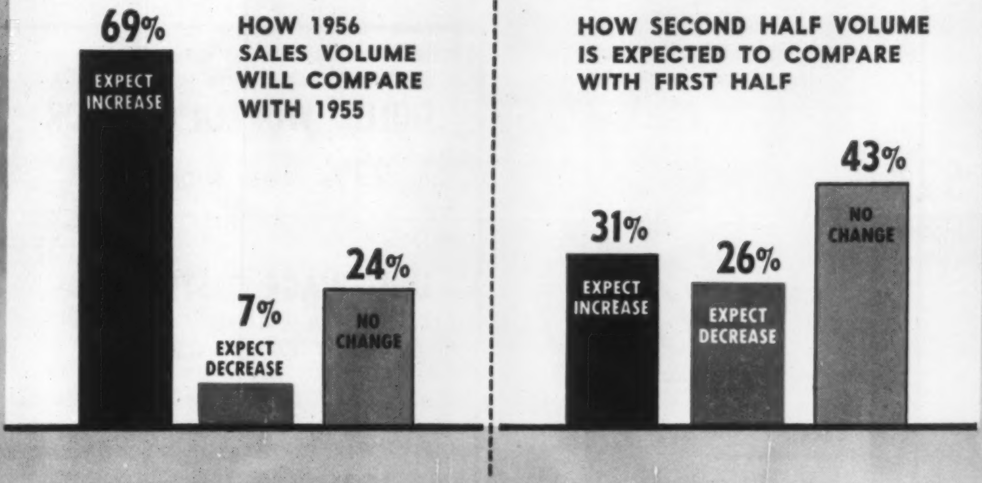
Those predictions are based on what the editors of this publication believe to be the best indicator of what lies ahead in metalworking: The thinking of the men who make the wheels turn. This year, STEEL asked 7600 managers of metalworking plants for their expectations over the next 12 months.

If the weighted consensus of the executives is correct, manufacturers' metalworking sales this year will soar to $138 billion. That is more than the national income in any year through 1942. It is higher than our gross national product for any year to 1942.

The projected sales figure again defines metalworking in the U. S. as the world's largest and most important industry.

Past Performance—Estimates by metalworking executives participating in STEEL's surveys in past years have been remarkably accurate. At the end of World War II, when economists generally were predicting a vast postwar depression, metalworking managers told STEEL that production, sales and employment would rise. They did. Again in late 1946, metalworking people contradicted the prophets of doom and predicted the boom would continue. It did.

In late 1953, the metalworking managers foresaw the adjustment of 1954, but they said it would be milder than most economists expected. It was. Again in late 1954, STEEL's respondents predicted the economy would snap back sharply and that the second half would be even better than the first



CHANGES EXPECTED IN SALES VOLUME DURING 1956

	Increases Expected in 1956	Second Half Compared to First Half
Analysis by Size of Plants		
Plants Employing 20-99	8%	+2%
Plants Employing 100-499	10%	+2%
Plants Employing 500 or more	8%	+1%
By Major Industry Groups		
S.I.C. 33—Primary Metals	7%	−3%
S.I.C. 34—Fabricated Metal Products . . .	9%	+6%
S.I.C. 35—Machinery (except electrical) . .	8%	same
S.I.C. 36—Electrical Machinery	11%	+3%
S.I.C. 37—Transportation	9%	same
S.I.C. 38—Instruments, Related Products . .	8%	+4%
Other Metalworking Groups*	8%	+6%

*S.I.C. 19, 25 and 39

half. They predicted a 10-per-cent increase over 1954, well above the average forecast. The increase was 20 per cent.

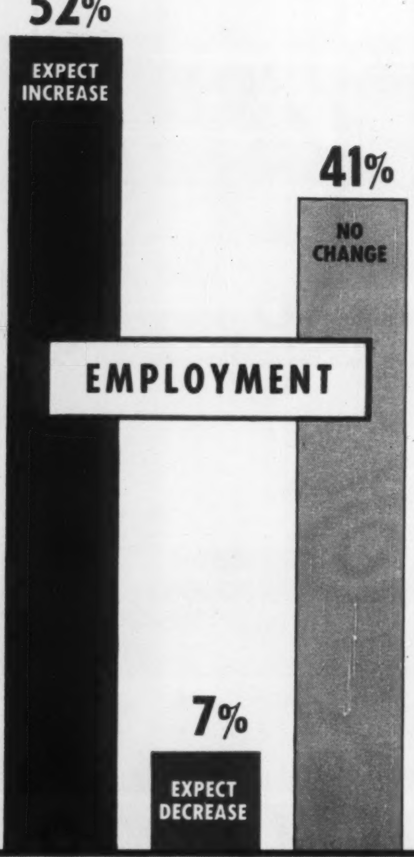
The Odds—Seven in ten managers replying to this year's questionnaire expect their dollar sales to be higher than they were in 1955. Only one in fourteen anticipates a lower volume.

Expectations for a higher volume are remarkably uniform through all industry groups. Most optimistic are the electrical machinery and equipment manufacturers who expect an 11-per-cent upturn. Lowest expectations are those of the primary metals people—even here the expected increase is 7 per cent! Fabricated metal products and transportation equipment manufacturers expect a 9-per-cent increase. Machinery, other than electrical instruments, and "other metalworking" groups expect an 8-per-cent increase.

How They Rank—Largest dollar sales among the

DEFENSE WORK will account for 11% of all metalworking production

	1956	1955
No defense work . .	49%	48%
Less than 25%	37%	38%
25-50%	8%	8%
50-75%	4%	3%
More than 75% . . .	2%	3%



SKILLED WORKER OUTLOOK

23% EXPECT SHORTAGE

UNIT WAGE COSTS

84% EXPECT INCREASE

4% EXPECT DECREASE

12% EXPECT NO CHANGE

FACTORS AFFECTING COSTS:	Per Cent of Plants*
More Overtime	21%
Less Overtime	10%
Higher Wage Rates	90%
Higher Productivity	21%
Lower Wage Rates	(†)
Lower Productivity	7%
Other	3%

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*Per cents add to more than 100% because many plants checked more than one factor.
†Less than 1/3 of 1%.

Metalworking Employment Will Rise 6%

Analysis by Size of Plants	INCREASE EXPECTED
Plants Employing 20-99	5%
Plants Employing 100-499	8%
Plants Employing 500 or more	4%
By Major Industry Groups	
S.I.C. 33—Primary Metals	2%
S.I.C. 34—Fabricated Metal Products	8%
S.I.C. 35—Machinery (except electrical)	6%
S.I.C. 36—Electrical Machinery	7%
S.I.C. 37—Transportation	7%
S.I.C. 38—Instruments, Related Products	6%
Other Metalworking Groups*	4%

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*S.I.C. 19, 25 and 39

metalworking industries will be marked up by the transportation equipment group this year ($45.4 billion). Automobile sales will be down from the 1955 volume, but other transportation equipment, particularly rail freight cars, will more than offset the decline. Second will be the primary metals group with $27.4 billion. Machinery, except electrical, will have sales of $25.2 billion; electrical machinery, $18.8 billion; fabricated metal products, $17.1 billion; and instruments, $4.8 billion.

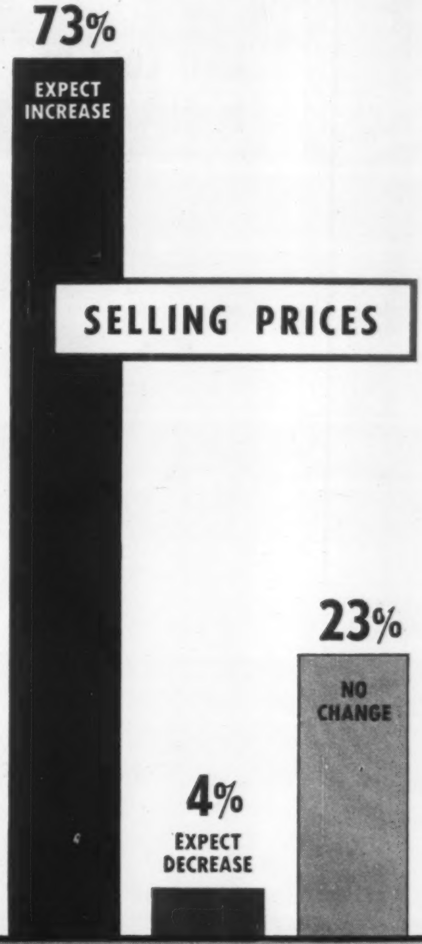
Expectations among companies of different sizes also are uniform. Small, medium and large plants see the increase in the 8-to-10-per-cent range.

Good All Year—Contradicting the often heard expectation that the first half of 1956 will be strong but that sales and production will taper off during the second half, STEEL's respondents predict the improvement will continue through the year. They expect second-half volume will be 2 per cent larger than the first half's.

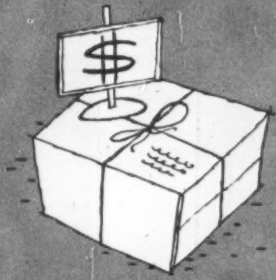
They made the same prediction a year ago, when the most commonly heard expectations of others were for a strong first half, followed by a rather sharp slump in the third quarter and perhaps a mild upturn in the fourth quarter. In STEEL's survey last year, respondents said their second-half business would be 2 per cent higher than the first half's. Their predictions were exceeded.

Troubles, Too

The year of record volume will not be without its troubles for metalworking managers. The No. 1 difficulty, as reported by survey respondents, will be getting sufficient materials, particularly steel and nickel. Many companies ran into steel short-

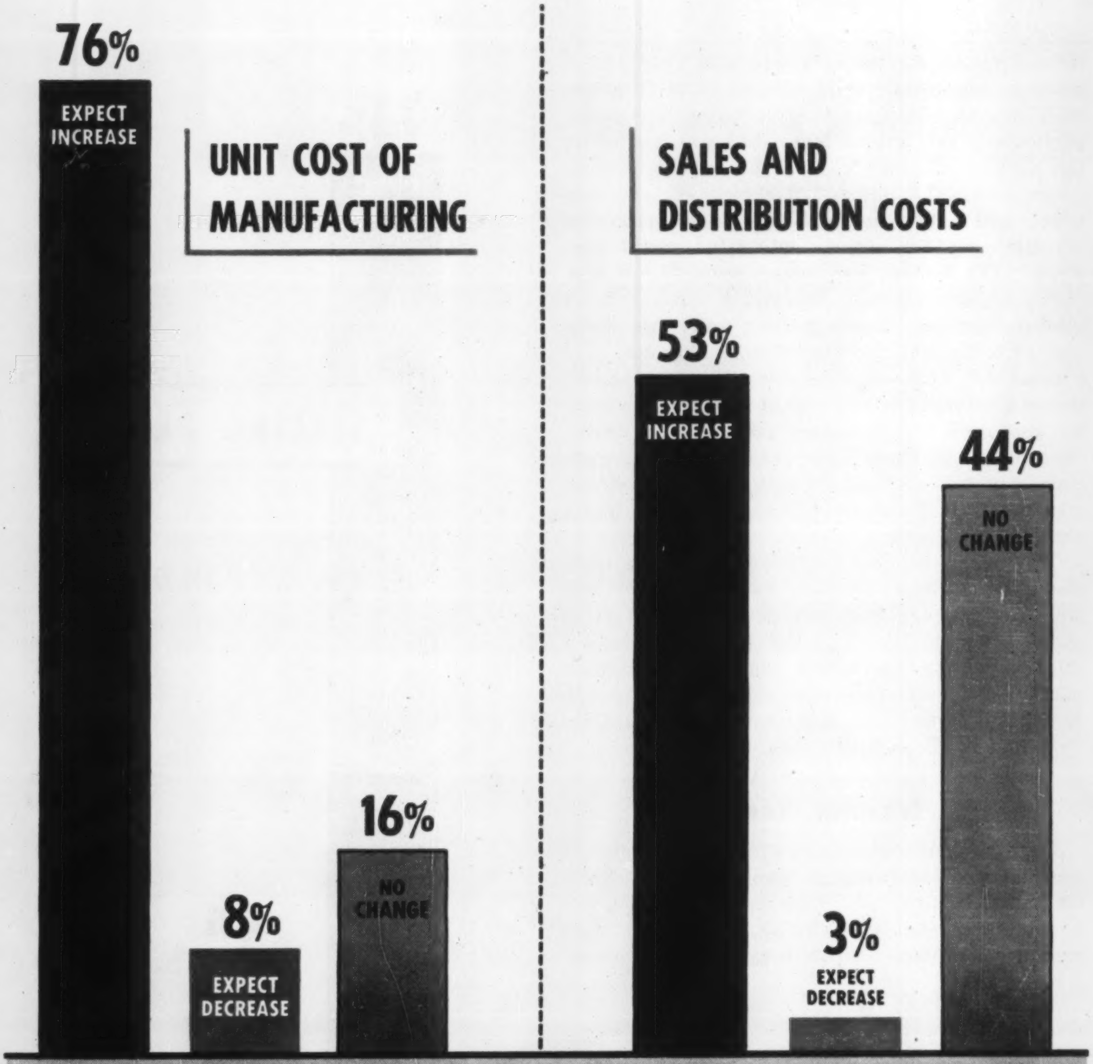


Selling Prices Will Go Up 5%



INCREASES EXPECTED By Major Industry Groups	INCREASE EXPECTED
S.I.C. 33—Primary Metals	4%
S.I.C. 34—Fabricated Metal Products	4%
S.I.C. 35—Machinery (except electrical)	5%
S.I.C. 36—Electrical Machinery	5%
S.I.C. 37—Transportation	5%
S.I.C. 38—Instruments, Related Products	5%
Other Metalworking Groups*	5%

*S.I.C. 19, 25 and 39



They'll Both Go Up About 4%

INCREASES EXPECTED **By Major Industry Groups**	UNIT COST OF MANUFACTURING	SALES & DISTRIBUTION COSTS
S.I.C. 33—Primary Metals	4%	3%
S.I.C. 34—Fabricated Metal Products . . .	4%	4%
S.I.C. 35—Machinery (except electrical) . .	4%	5%
S.I.C. 36—Electrical Machinery	4%	4%
S.I.C. 37—Transportation	5%	3%
S.I.C. 38—Instruments, Related Products . .	3%	4%
Other Metalworking Groups*	4%	5%

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*S.I.C. 19, 25 and 39

Capacity Is Expected To Expand 6%

60% OF ALL PLANTS EXPECT TO INCREASE THEIR CAPACITY

	15% WILL BUILD NEW PLANTS	40% WILL BUILD ADDITIONS	88% WILL BUY EQUIPMENT	6% INCREASED CAPACITY
Analysis by Size of Plants				
Plants Employing 20-99	14%	37%	90%	7%
Plants Employing 100-499	19%	42%	83%	4%
Plants Employing 500 or more	10%	53%	89%	3%
By Major Industry Groups				
S.I.C. 33—Primary Metals	9%	50%	93%	4%
S.I.C. 34—Fabricated Metal Products	23%	41%	91%	8%
S.I.C. 35—Machinery (except electrical)	6%	34%	90%	5%
S.I.C. 36—Electrical Machinery	23%	49%	81%	7%
S.I.C. 37—Transportation	10%	54%	82%	4%
S.I.C. 38—Instruments, Related Products	28%	37%	69%	7%
Other Metalworking Groups*	22%	32%	83%	2%

*S.I.C. 19, 25 and 39

ages late in 1955 and anticipate that shortages will be substantially worse in 1956.

"We expect our sales to be limited only by our ability to obtain steel to produce our product," says a midwestern sheet metal fabricator. "We can sell much more than we can produce."

Steel foundries report that the nickel shortage will continue to limit their production of high-alloy castings. That likely will cause some delay in the expansion of steel and nonferrous rolling mills.

"Any expansion in our production will depend entirely on our ability to obtain a greater tonnage of cold-rolled bars," reports an Ohio manufacturer, who adds that "this does not seem likely."

Shys Away from Customers—A western structural steel fabricator sees the shortage in steel shapes and plates as his most difficult problem in 1956. "Our backlog entering the new year is the highest in our history, but we just can't get enough plain material from the mills. Our suppliers tell us that this situation should improve by midyear when new structural capacity will get into production. Until then, it's going to be tough to face our customers."

Difficulty in procuring hot-rolled sheets is restricting the sales of a Michigan auto parts supplier. "The tendency of the mills toward rolling more cold-rolled sheets has eliminated two of our major suppliers. Hot-rolled bars also are difficult, if not impossible. The big mills should get out of this business and let the smaller mills make them at a slightly higher price, so that there would be a dependable source of supply."

Wants Price Adjustment—"The shortage of hot-rolled sheets and plates is controlling our production now," says a southern tank fabricator. "Mills

MARKET RESEARCH

94% Do not have a formal marketing research department.

3% Plan to start one in 1956.

PRODUCT RESEARCH

36% Plan to spend more.

3% Plan to spend less.

61% Plan to spend same as 1955.

NEW PRODUCTS

63% Plan to introduce new products in 1956.

STRONGER SELLING

78% Will strengthen their selling organization in 1956.

OF THOSE—

56% Will add new salesmen.

45% Will have more distributors.

23% Will seek more export sales.

56% Will increase advertising and sales promotion.

are rolling more cold-rolled sheets because they are more profitable. There should be an adjustment in hot-rolled sheet prices, so that the mills would allocate more ingots for hot-rolled sheets."

A Wisconsin automotive partsmaker sums up the complaint of hundreds of metalworking companies: "If only something could be done to get a decided increase in steel production—at once!"

Fear Higher Prices — A number of consumers hungry for plates, shapes, hot-rolled sheet and bars suggest that the mills should raise prices on those products to make them more profitable, and then allocate more ingots to their production. Many other steel consumers are angered by reported plans to boost steel prices substantially.

Trade Too Free—Foreign competition is causing concern in new quarters.

An eastern paper machinery manufacturer points out that European labor rates are 60 to 75 per cent less than in this country and that price competition is extremely difficult. He says his company is investigating the possibilities of subcontracting work in Europe.

"Our company is faced with strenuous competition from imported German machinery manufactured at considerably lower wage rates," says a producer of graphic arts equipment.

"Foreign competition is really getting tough," reports a New England instrument manufacturer.

Politics

Hundreds of metalworking men think politics are going to have a big influence on business this year. They disagree violently on what that influence is going to be.

Some think that uncertainty over the complexion of the next national administration will cause faltering in the second half.

About as many believe that the administration will make darned sure that business is good.

A nonintegrated steel producer believes: "The election will cast some uncertainties on market conditions in the second half, but the magnitude of that will be dampened by the healthy state of the economy."

"The administration will do everything in its power to keep business booming," predicts an aluminum foundry operator. "We expect a steady increase all through the year."

An electronic equipment producer (who says he is a life-long Republican) thinks: "The sooner we realize that it doesn't make a bit of difference who is President, the sooner we can get back to business."

Technical Developments

More efficient methods and processes are mentioned by scores of managers as means of improving their competitive situation and avoiding the pinch between higher labor and materials costs.

Automation creeps into replies much more often than it has in past surveys.

"We are mechanizing more of our hand operations and expect to materially reduce our costs," says a New Jersey stamper.

A Michigan founder finds: "Never before has the foundry industry faced so many changes and developments in new methods, metals and applications for castings."

"Automation is increasing competition and increasing the demand for remote control mechanisms, which benefits us," reports an Ohio electronic manufacturer.

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If you require hot or cold rolled sheet or strip steel . . . choose a specialist who understands your production problems . . . and delivers according to your specifications.

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"Swede" *pig iron*
Steel Products
Plates (sheared)
Hot rolled sheets
Hot rolled strip
Cold rolled sheets
Cold rolled strip
Rolled Steel Floor Plate
A.W. Algrip *abrasive*
A.W. Super-Diamond *pattern*
A.W. Cut Nails
Mine Products
Coke
Coal Chemicals

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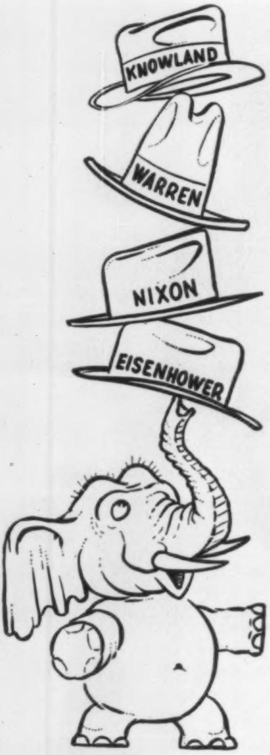
AW-51

In Political Campaigning This Year:

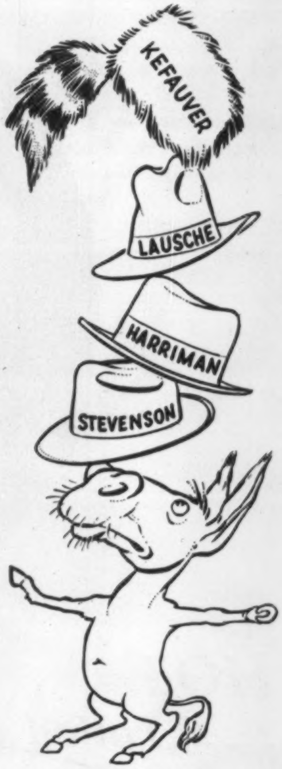


REPUBLICANS will depend on "Progress, Peace and Prosperity." "American wage earners today have more jobs at higher wages, with greater purchasing power and less strikes than at any time in history, and they have peace to boot," to quote Vice President Nixon. GOP talking points: A balanced budget (in spite of 1954's record tax reduction of $7.4 billion); economy in government; confidence of consumers and businessmen alike in the nation's economy; getting the government out of business; halting inflation.

DEMOCRATS will hit big business administration.

"The difference between the Democratic party and the Republican party is that the Democratic party believes that what is good for the country is good for business; while the Republican party believes that what is good for business is good for the country," says Paul M. Butler, chairman, Democratic National Committee. There will be continued sniping at big business; businessmen in government; the farm problem; Dixon-Yates. More Congressional investigations are coming up.

Both sides will make political hay with their legislative programs. Getting there "fustest with the mostest" is likely to be the rule on issues like highways, schools, tax cuts.



Presidential campaigns will, to an unusual degree, mix . . .

Politics, Business in '56

POLITICS will dominate the Washington arena in 1956. Both parties will operate with a careful eye on the fall elections.

Democratic leaders insist the next session (like the last one) will be guided by the opposition party's new slogan—"legislative responsibility."

Republicans snap back that Democrats still tried to turn Eisenhower measures into political capital and will try again. So Republicans say they may not be above playing a little election-year politics themselves.

Tactics—The procedure is likely to go like this: Each party will try to present a plan a little bigger and/or better than the other.

Republicans, with their avowed dedication to a balanced budget, may be hampered a bit in the infighting. With the goal definitely at hand, the administration isn't likely to do anything to lose it.

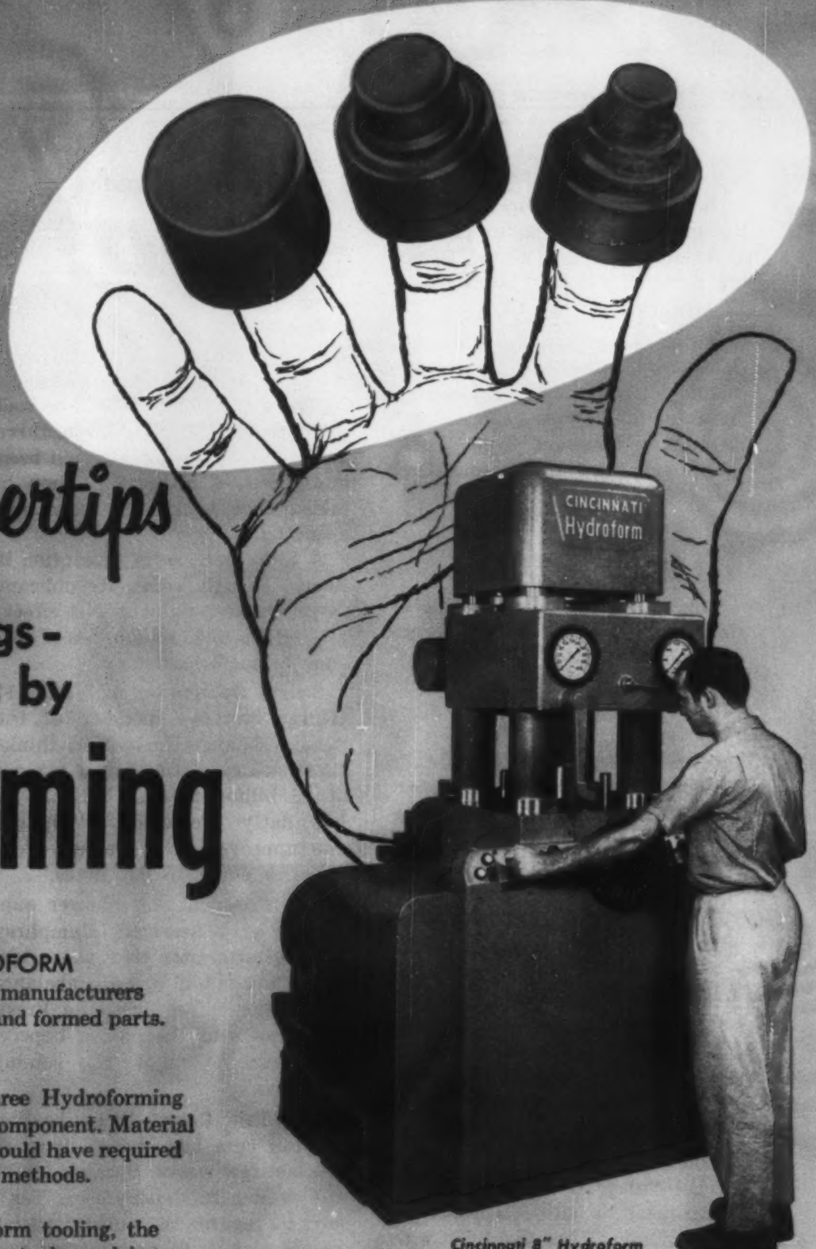
Politics: Silence Is Golden

The biggest question of the year: Is Ike going to run? Chances are an answer will be put off as long as possible.

If the President says no, a likely time to announce it is before the Feb. 1 filing date for the New Hampshire presidential primary. That would give party hopefuls a chance to test vote-getting ability and the party a chance to begin grooming a candidate.

Timing—An early negative announcement would surely hamper the President's ability to get his 1956 program through Congress. If no announcement is made before Feb. 1, none will be made until spring.

Senatorial races will be in a particularly bright spotlight this fall. The way it lights up now, the Republicans will have a tougher time regaining control of the upper chamber than the Democrats



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Hydroforming

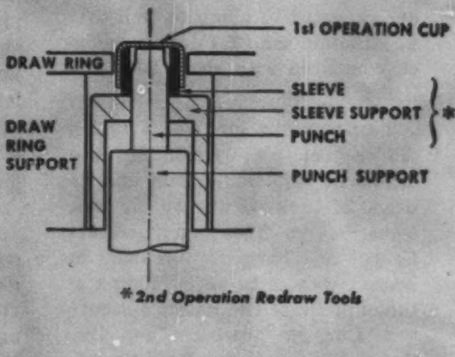
Cincinnati 8" Hydroform

THE NEW CINCINNATI 8" HYDROFORM brings decided time and cost savings to manufacturers required to produce small, deep drawn and formed parts. Illustrated above is a typical example.

The photo shows, in sequence, the three Hydroforming operations to produce an electron tube component. Material is 0.020" O. F. H. C. copper. This part would have required five or six operations by conventional methods.

To illustrate the simplicity of Hydroform tooling, the diagram below, right, shows the redraw tools used in the second operation. The sleeve, sleeve support and punch were made of ordinary steel, turned on a lathe. The 1½" dia. x 1¼" deep 1st operation cup was simply placed on the sleeve and redrawn. Redraw tools for the final operation were similar and equally inexpensive.

Parts from sheet materials up to ¼" steel, from blanks up to 8" in diameter, can be drawn on the 8" Hydroform. Maximum draw depth is 5". For larger work, Hydroform machines of 12", 19", 23", 26" and 32" capacities are available. Let a Cincinnati Milling field engineer give you detailed information on how you can profitably apply Hydroforming to your work. For a description of the process and specifications of the six machine sizes, write for Bulletin M-1908.



*2nd Operation Redraw Tools

CINCINNATI Hydroform

PROCESS MACHINERY DIVISION

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will have holding on to it.

Outlook—It boils down to this: Republicans can hope to pick up a maximum of five seats; Democrats could possibly latch on to 12 now held by the GOP.

Watch these states: California, Colorado, Connecticut, Illinois, Indiana, Maryland, Ohio, Pennsylvania, Utah, Wisconsin, Idaho, Kentucky, Missouri, New York, Oklahoma, Washington and Oregon.

Defense: Ike's Hike

Government spending is due to rise in spite of Republican economy efforts. Higher defense spending is the reason. President Eisenhower stole a potential political issue from the Democrats when he announced plans to hike military spending by $1 billion next year. Democrats are sure to go along with the proposal. The fiscal 1957 defense budget will be about $35.5 billion.

More complex (and so more costly) weapons—guided missiles, planes, warships and other armaments—along with rising costs in general are reasons for the jump. It's likely that a good bit of the increase will be eaten up by higher prices.

Global Defense — Another part of the increase will go to develop the "ultimate weapon"—intercontinental ballistics missiles capable of carrying a hydrogen warhead.

Funds for missile development are expected to climb to well over $1 billion in the 1957 defense budget, compared with about $600 million this year.

Two more reasons for a higher defense budget: Rumbling war drums in the Middle East and renewal of the cold war by the Russians. Even Treasury Secretary George M. Humphrey has said he doesn't want a balanced budget at the expense of the nation's security. Current prospects for continued high revenues from the nation's full-speed-ahead economy make it appear we can have both of them.

Taxes and Politics

A safe bet: No cut in corporate income taxes (scheduled to drop to 47 per cent in April) or in excises.

Personal Tax Cut—Budget balancing notwithstanding, the political appeal of a personal income tax cut in an election year will be well nigh irresistible. In addition, there are economists who say we'll need a tax cut of about $3 billion in midsummer to pep up consumer spending.

A $100 increase in exemption is likely, though some Republicans favor a percentage cut. Net effect: $2.5 billion to $3 billion loss of revenue to the treasury.

Senate Opinion—Sen. Walter F. George, veteran member of the Senate Finance Committee, thinks the treasury can absorb a tax cut of $3 billion to $3.5 billion. He has flatly predicted: "Whether one approves of it or not, Congress is going to cut taxes."

But President Eisenhower supposedly gave Secretary Humphrey private assurance that there will be no tax cut if it will unbalance the budget. Yet even the President has said that he is hopeful taxes can be cut in the coming year.

Tax Talk Cools—Drum beating for tax cuts has slowed down in the last few weeks. Speaker of the House Sam Rayburn (Dem., Tex.) says he regards the world situation as too serious to risk cutting revenues. Chairman Clarence Cannon (Dem., Mo.) of the House Appropriations Committee says: "We should not even consider a tax cut until: 1. We have balanced the budget. 2. Agreed to a systematic reduction of the national debt. 3. Made sure our national defense is adequate."

The opinions of House members are especially significant because only the House can initiate tax legislation. Rep. Daniel A. Reed (Rep., N. Y.), ranking Republican member of the taxwriting Ways & Means Committee and foremost advocate of tax cuts in 1953 and 1954, described predictions of further substantial cuts "premature." He urges careful appraisal of the world situation and the inflationary impact of tax cuts.

Crucial Farm Vote

Both sides are after the farm vote; it would have a bigger than usual effect on who controls the next Congress.

Democrats are committed to high, rigid price supports at 90 per cent of parity.

Republicans will go along with Agriculture Secretary Ezra T. Benson's flexible program and point out: 1. Almost two-thirds of the decline in farm prices came during the Truman administration and that practically all the decline occurred under the law passed by that administration. 2. The Benson flexible price support program is getting its first test with the harvesting of crops this fall.

A farm conference similar to the recent one on education is likely.

The Dixon-Yates Problem

Democratic exploitation of the Dixon-Yates power contract will continue. The Democrats got an assist in keeping the issue sizzling when the power combine filed a $3.5-million breach of contract suit against the government.

A "most stubborn" government defense "with no holds barred" is called for by Sen. Clinton P. Anderson (Dem., N. M.), chairman of the Joint Committee on Atomic Energy. He will ask Congress to name its own special attorney both to defend the government and to investigate possible "conflict of interest" violation (presumably involving Adolphe H. Wenzell).

Until recently, Mr. Wenzell was vice president and director of First Boston Corp., New York, which served as the contract's financing agent. At the same time, as a Budget Bureau consultant, he helped the government draw up the contract and negotiate with Dixon-Yates.

Investigations

You can be pretty sure the 84th Congress will set an "investiga-

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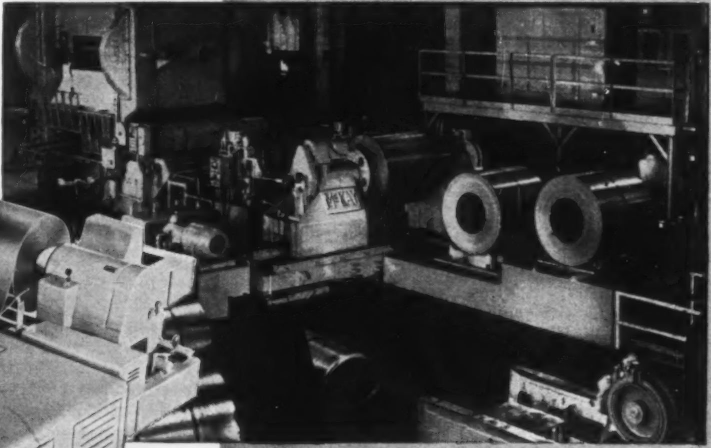
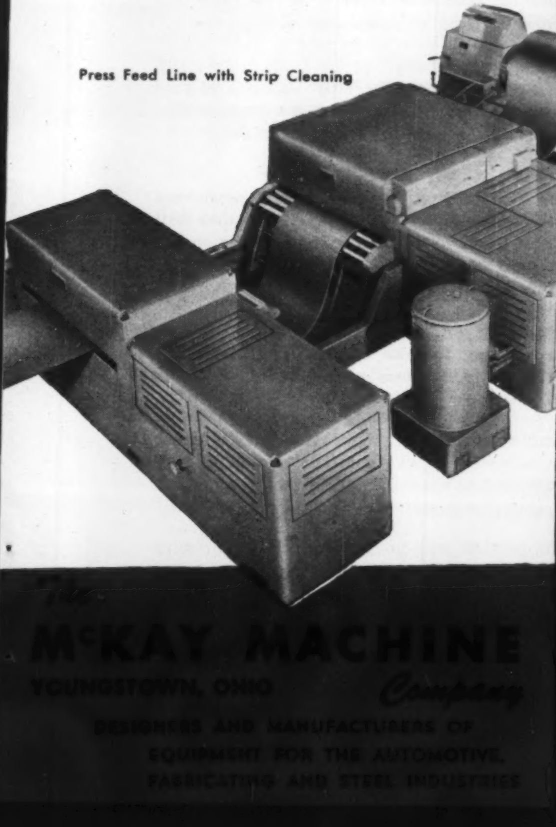


Automatic Press Feed Lines



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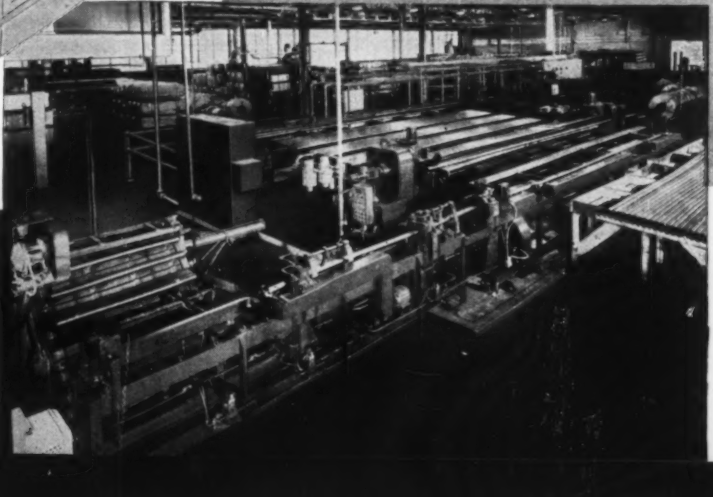

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tion" record. Well over one hundred inquiries have covered subjects ranging from atomic preparedness to causes of unemployment in the clothespin industry.

More Coming Up—Likely candidates: Big companies, mergers and the radio and television industry.

Walter Reuther has called for probes into wages, prices and profits in the steel, auto and farm equipment industries.

Trouble with WOCs — WOCs will get another going over. Further limitations on WOC activities are likely. The committee that checked up on Commerce department's Business Advisory Committee split down party lines.

The Democratic majority recommended that BAC should: Be headed by a full-time government employee; confine meetings to an agenda prepared by the Commerce department; keep full minutes of all meetings; and subject its subcommittee membership to appoint-

Legislative Prospects, 1956:

TAXES—A personal income tax cut is a good bet—budget picture in spring will determine size. Chances are nil for lower corporate income taxes or excises.

HIGHWAY—This is a "must" because of still-growing public clamor. The President will want a bigger program, but it will be a healthy start in that direction. No bond financing—which Democrats label the "bankers' program."

SCHOOLS—The classroom deficit is estimated at 200,000, and the people demand action. Go-ahead will be given to the multi-billion-dollar program (which now lacks funds). Republicans propose loans. Democrats want (and will probably get) grants.

FARM—A real party-line battle is shaping up. Democrats could muster enough strength to ram through a return to rigid, 90-percent-of-parity price supports—even in the face of a Presidential veto threat. The administration will get some of its farm program approved.

NATURAL GAS—The bill to exempt independent producers from federal control has already passed the House, and will be one of the first items to come up in the Senate. Democrats are split, but so are Republicans. Enough support may be found to get the measure through.

HEALTH—Hospital building and research programs will be O.K.'d., with both sides trying to take credit. Ike's health reinsurance plans won't get much attention.

WATER RESOURCES—The Upper Colorado project probably will get through (Senate has already approved it). On most others there will be a hassel over whether they should be federal or private (or state, in the case of Niagara) developments. This may hold up approval of some.

FOREIGN AID—Both parties will go along pretty well with the President. Appropriations should approximate this year's

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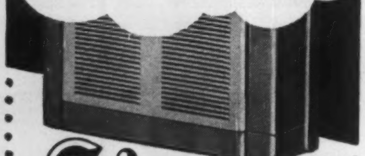

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ment by the commerce secretary.

The Democrats also called BAC "an administrative lobby . . . built into the executive branch of the government." You can look for more of that sort of name calling as the Democrats step up their campaign to label Republicans the party of big business.

Easier Credit in '56?

Look also for credit to get easier as 1956 rolls along. Two mid-December actions indicated how closely the government is watching the credit situation: 1. Federal Reserve Board helped commercial banks out of a pre-Christmas credit squeeze. 2. Federal Home Loan Bank Board introduced a "stand-by credit" policy for the 4317 savings and loan organizations that finance a good share of housing mortgages; it could make more than $1 billion in new mortgage credit available.

Perhaps even more important

$2.7 billion, in spite of some pressures for an increase, some for a cut. The post-Geneva cool-off and Russia's stepped-up economic aid program have pretty well scuttled chances of a reduction. Few in a position to do anything about increasing the program are highly enthusiastic.

FOREIGN TRADE—The President will probably have his way here, too, meaning some easing of tariffs, customs simplification.

HOUSING—Republican plans don't have much of a chance; Democrats will put in their own, "bigger, better," even though administration officials say demand for public housing starts is no greater than the 35,000 a year the President will ask for.

WAGE-HOUR LAW—Extension to cover trade and service groups is likely, especially if the Democrats figure they can take some of the credit.

TAFT-HARTLEY ACT—No action here. In fact, a good many Congressmen in both parties would be happier if no mention were made of T-H.

SOCIAL SECURITY—The House passed a bill to lower retirement age for women from 65 to 62, give benefits to disabled workers 50 and over, extend coverage. It would mean immediate benefits to more than 1 million people. Employer-employee contributions would go up to 2.5 per cent of payroll now, rise to 4.5 per cent by 1975. There's doubt about the financial soundness of the plan, which may tie it up in the Senate. Some expansion is likely.

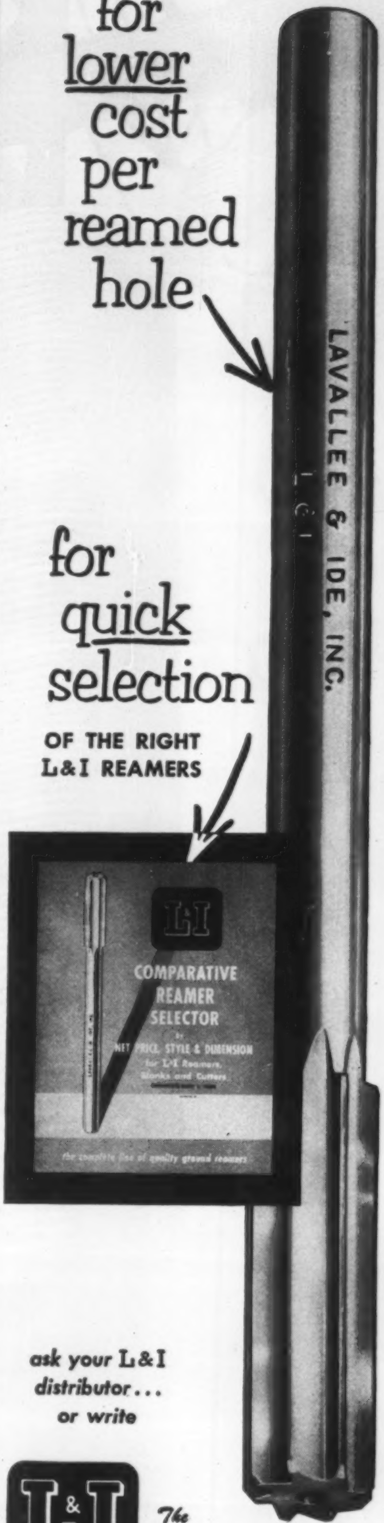
DEPRESSED AREAS—They may get some help. A possible Commerce-Labor Department squabble to control the plan could upset the works and result in a watered-down program, or none at all.

DISASTER INSURANCE—Though both sides favor it in some form, they won't be able to get together on a workable solution.

IMMIGRATION, NATURALIZATION—Again, an issue that

(Continued on Page 121)

for lower cost per reamed hole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than the immediate new credit available is a feeling among lenders that they can begin planning for more normal operations later this year. That alone should give a lift to recently lagging homebuilding.

Stockpile Policy

Another lift to the economy is diversion to industry of metals originally scheduled for government stockpile. Already waived are first-half shipments of aluminum, first-quarter shipments of copper and nickel.

As long as the present economic boom continues at its present pace, there's a good chance stockpile diversions will continue. They will be cut out as soon as there is good evidence that users are putting significant amounts of metal into inventory.

Labor and Politics

The merged AFL-CIO will be talked about plenty this year, may even be talked against, but certainly there will be no "monopoly" investigation of the new union.

You can look for plenty of political action on the part of the union. It definitely wants a "friendly" administration and will spend to get it.

Also on the agenda: A continuing active campaign against state right-to-work laws.

Civil Rights: Livelier Issue

Pretty much absent from the legislative agenda in the first session of the 84th Congress, civil rights issues are sure to come up in this one.

Rep. Adam Clayton Powell Jr. (Dem., N. Y.) is setting up a bloc in the House, expects to have 201 of the 435 House members lined up in support of the group's legislative objectives by the time Congress starts back to work.

"One of the first things we plan to attack is the problem of giving the Justice department more power in areas where there is a breakdown in civil liberties, terrorism, lynching and murder," says Mr. Powell.

The administration also is talking over civil rights issues.

Legislative Prospects, 1956:

(Continued from Page 119)

both sides are working on. Perhaps some liberalization, but no major changes.

MILITARY RESERVES—The President will propose strengthening the Reserve Forces Act of last year. When he signed it, he said it fell short of what is needed.

DEFENSE PRODUCTION ACT—A two-year extension was asked for last year, but Congress got tied up in the WOC issue. It was extended one year and certainly will be extended again—for how long depends on whether Congress has time to take a close look at it.

RENEGOTIATION—Congress is taking a long look at the act. It may be allowed to expire at the end of this year.

WATER POLLUTION—In the works is a Senate plan to give the federal government more authority to sue industries to halt pollution.

SECURITIES REGISTRATION—The Fullbright bill (S. 2054) calls for registration and proxy provisions of the Securities & Exchange Commission to be applied to small corporations whose securities are not listed on exchanges.

POSTAL RATES—Ike's proposed increases will get nowhere.

POLL TAX—Elimination proposals have been around for some time. Perhaps the measure can get off the ground with Senator Johnson's backing.

EXECUTIVE PAY—The House passed, the Senate shelved scheduled pay raises for top government executives. Chances are doubtful, but they could be approved.

VOTING—The President wants the legal age lowered to 18, franchise for District of Columbia residents. Chances seem slim.

HOOVER COMMISSION—Some of the recommendations requiring legislation will be put through, but their number (close to 200) precludes passage of any great percentage. Getting government out of business is at a dead end for a while.

GI LOANS—Extension of World War II veterans' eligibility past the 1957 deadline.

UNION WELFARE FUNDS—Chances are good for some kind of regulation, at least a requirement of public disclosure of financial transactions.

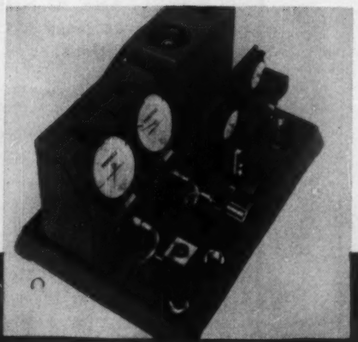
CIVIL AIRPORTS—Possibility of bigger financial grants.

ATOMIC SHIP—Ike's "peace ship" idea gets little encouragement. Democrats say they are willing to authorize a "practical" nuclear commercial vessel but don't want to waste money on a show boat.

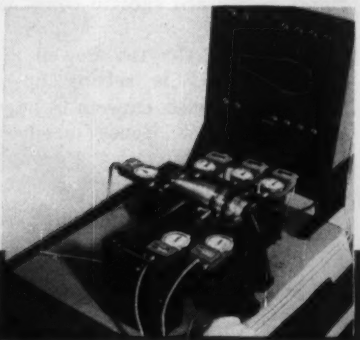
HAWAIIAN STATEHOOD—Will be considered again, but approval is unlikely so long as Hawaiian and Alaskan statehood are tied together on the same bill.

IMPORTS—Metal scrap duties and import taxes—suspension continued.

DIAL INDICATOR GAGE
checks O.D. runout and squareness of face of hobs quickly, accurately, and for much less cost than any other gaging system.



AIR GAGES
check I.D. and chordal height of arc-like workpieces. The Dial Indicators check squareness of faces and concentricity of two diameters. Typical illustration of how Federal combines gaging systems to suit requirements.



MULTIPLE DIMENSION "PICTURE PANEL" GAGE
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Electricators show how much tolerance varies (from nominal).

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Too often, a gage is bought to inspect certain dimensions without due consideration of other factors which may be of even greater importance than its ability to gage accurately. Buying any type or system of dimensional gage with a higher degree of accuracy than required . . . and at a higher price, *is just poor economy.*

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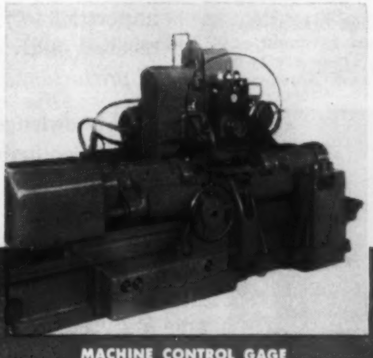
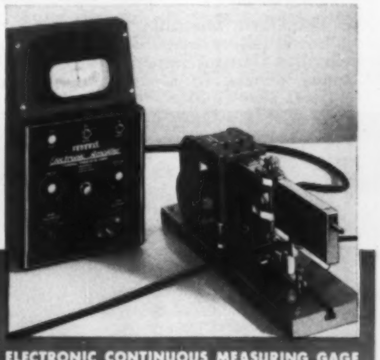
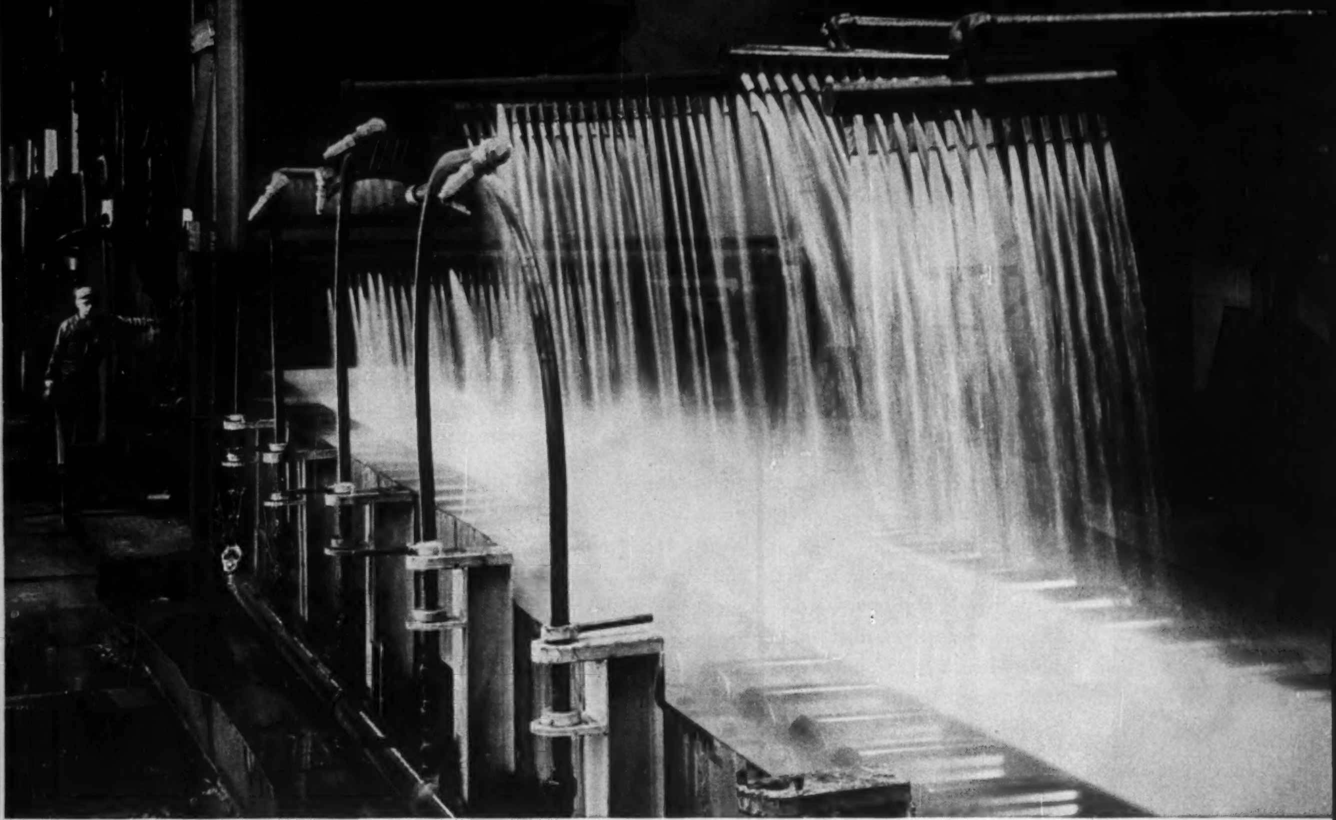


MACHINE CONTROL GAGE uses Air-Electric gaging system to automatically control grinding wheel on cylindrical grinder. Gage backs wheel off at finish diameter. Lights indicate approach and final size.



ELECTRONIC CONTINUOUS MEASURING GAGE is used to detect variations in the width of moving picture film after it has been slit into its standard width.



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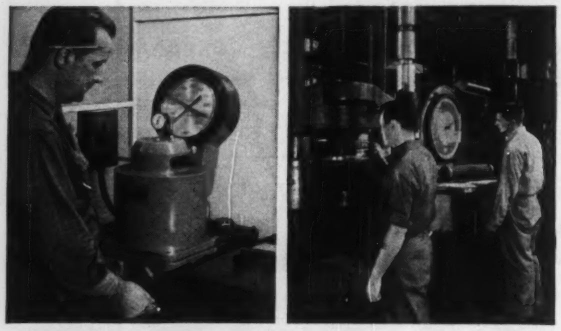
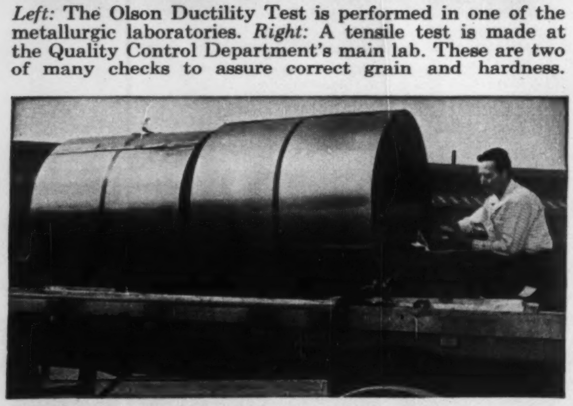


Left: The Olson Ductility Test is performed in one of the metallurgic laboratories. *Right:* A tensile test is made at the Quality Control Department's main lab. These are two of many checks to assure correct grain and hardness.



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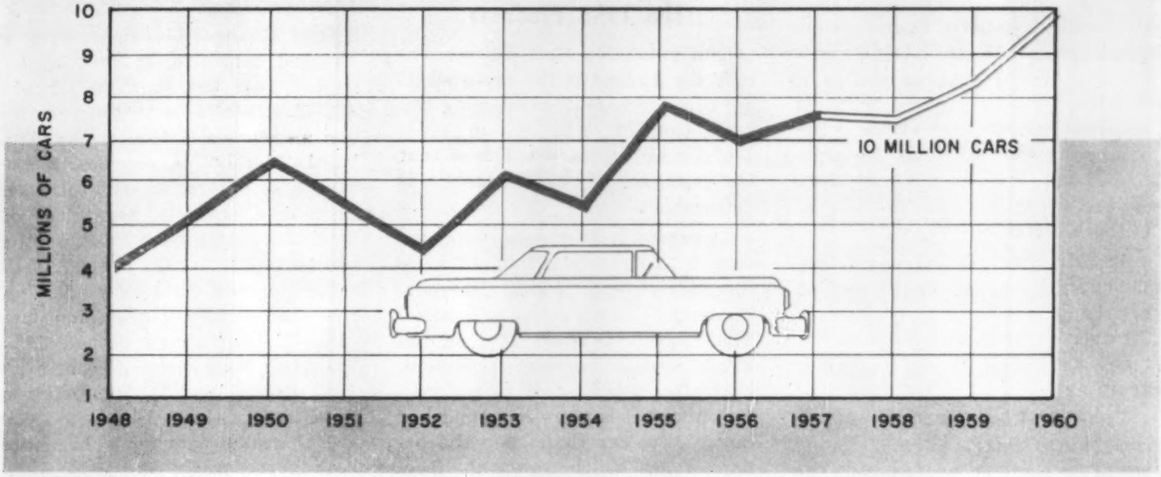
By **FLOYD G. LAWRENCE** *Detroit Editor*

How Production Years Stack Up



10 Million Cars in 1960?

WITH THE CONFIDENCE of a man finding a diamond watch in a box of Crackerjack, the automakers are predicting 1956 will be another Crackerjack year.

An interesting backdrop is provided by their estimates of a year ago at this time. In virtual agreement on about 6.8 million passenger cars and trucks for 1955, most raised their eyebrows when the estimate was upped two months later by Harlow Curtice, General Motors Corp. president.

Careful Optimism — Said Mr. Curtice: "Provided we continue to enjoy labor peace, the automobile industry may well produce and the domestic market absorb about 7.5 million passenger cars and trucks in 1955 instead of 6.8 million units." Citing this "possible 20 per cent increase in volume over 1954," he ventured: "1955 could be the biggest passenger car year in the history of the automobile industry."

Mr. Curtice, a man noted for spring optimism, turned out to be a pessimist in the fall. Only the last portion of his "could be" statement was correct. Indeed, 1955 was the best year in the history of the auto industry.

Banner Year—Against the 6.8 million industry estimate, 9.25 million passenger cars and trucks were produced. Rather than a 20 per cent increase over 1954, 1955 volume was up 40 per cent. The previous record of 1950 was topped by more than a million units. And as the automakers look at the $14 billion sales they notched at the wholesale level, more than $3 billion higher than the previous record, you might expect them to pick up their winnings quietly.

But the automakers are not about to be wrong two years in a row at least not in the same direction. This year you won't find anything but optimism.

New Thinking—Typical is the statement of W. J. Simons, Chrysler Corp. treasurer: "Some say that 1955 is an abnormal year and that production and sales for 1956 must be lower. On the contrary, it is more true than not that 1955 was the first year in the entire postwar period that the industry and the economy did not face substantially abnormal conditions of one form or another.

"It is the first year to give concrete evidence of the underlying strength of consumer demand for automobiles. It is the first year that basic consumer demand was able to express itself."

One problem: consumer demand was leaving the rostrum as 1955 ended.

The Sales Outlook

Dealer inventories began accumulating shortly after new model introductions for many 1956 offerings. By mid-November, they were above 500,000 units and 98 per cent above the figure one year previous. By mid-December, many factories were beginning to ease the output pressure and were limbering up sales promotion artillery usually saved for later on in the model year.

Credit—There seems to be no indication that people have lost their confidence. The record rate of installment debt underlying demand for cars does not disturb the automakers. Ford's Lewis D. Crusoe notes that repossessions are lower

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than prewar, and delinquent payments are running about 1.2 per cent, which is lower than in 1952, 1953 or 1954. General Motors Acceptance Corp. President Charles G. Stradella reports that average down payments on GMAC new car accounts were 40 per cent as of October, 1955, compared with 43 per cent as of June, 1954. The average term on these accounts rose from 24.4 months in June of last year to 28.5 months in October, 1955.

But Mr. Stradella points out that the average monthly installment on new cars represents 17 per cent of the average household income after taxes, as against 21 per cent a few years ago.

Two-Car Families—The general economic climate, as well, would seem to portend goodies for the automakers. Statistics indicate one-third of all new car buyers have two or more cars and that the number of two-car families in the U. S. will increase 70 per cent in the next five years. Within five years, some 74 per cent of U. S. families will be car owners, compared with only 66 per cent today.

But sound knowledge of the balmy climate doesn't preclude the occasional need for an umbrella.

The 1956 Products

One indication that automakers may see a cloud is the expected 30 per cent increase in advertising and promotion expenditures in 1956. For it's unfortunate but true that the purchase of an automobile is deferrable.

Changes—Importantly changed cars were introduced in 1955 by Chrysler Corp., Ford, Mercury, Packard, Chevrolet and Pontiac. The impact of these cars on the public cannot be evaded. Shortly thereafter people start to rationalize on why it is more economical to buy a new car than keep the old one. Makes which were only facelifted are benefited, too, since the decision is for a new car, and 70 per cent buy the same make they trade in.

But the people who bought new cars in 1955 because their neighbors did probably won't have this competitive pressure in 1956. In part that will be because some who intended to buy cars in 1956 were tempted to buy in 1955. The fewer new cars there are on the street, the less becomes the competitive pressure to buy.

OUTPUT ESTIMATES FOR 1956

	1955	1956
Chevrolet	1,855,000	2,000,000*
Ford	1,780,000	1,780,000*
Buick	800,000	900,000
Plymouth	740,000	800,000
Oldsmobile	625,000	750,000
Pontiac	600,000	700,000
Mercury	440,000	450,000
Dodge	313,000	313,000*
Chrysler	177,000	201,000
Studebaker	110,000	200,000
Nash	51,500	157,000
Cadillac	152,500	156,000
DeSoto	127,000	150,000
Rambler	87,100	150,000
Packard	69,600	100,000
Lincoln	40,000	60,000
Hudson	27,300	54,600
Continental	1,100	4,000

*No estimate made officially

Real Changes — Fundamentally changed cars offered for 1956 include Studebaker, Rambler, Lincoln and Continental, with the remainder merely changed versions. The word "merely" is not descriptive of the automaker expenditures on their new products, regardless of how the public may react to the changes. Chrysler Corp. spent $175 million to put its 1956 models on the road — only $75 million less than it spent on its all-new 1955 line. And Ford division reports its 1956 product cost 11 times more to facelift than the 1954 job.

But while cars may be more readily recognized as "1956" than in many facelift years, there is a subtle psychological factor which makes a man say: "That car isn't just changed . . . it's *different*."

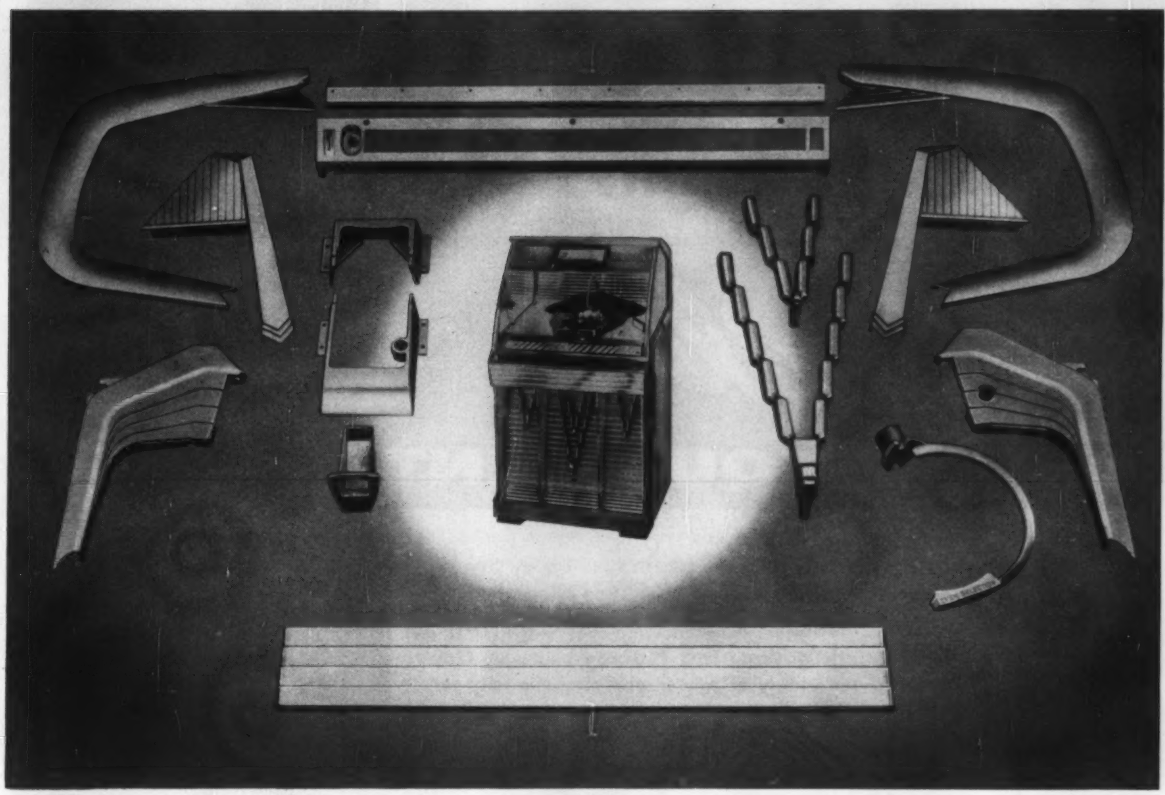
The 1957 Products

But an important consideration is the negligible correlation between calendar and model years. A substantial portion of car sales in calendar 1956 will be 1957 models. With the expected introduction of 1957 jobs bulking in August and September rather than in October and November as in 1955, it's not inconceivable that nearly half the cars sold in 1956 might bear the 1957 label.

Really New—There's little doubt that 1957 jobs will hold off any seasonal sag tendencies in the market and may boost the second half output higher than the first half. New bodies are planned for Plymouth, Dodge, DeSoto, Chrysler, Imperial, Ford, Mercury, Buick, Oldsmobile, Cadillac, Nash, Hudson, Packard and Clipper. All will feature a version of step-down design—using a ladder-type frame, as on the Continental, or integral body-frame construction similar to the prewar Hudsons.

But lowness will be only one distinguishing feature of the 1957 models. Tail fins will truly hit a new high and will be canted outward in a manner similar to the Ford dream car Futura. This little

WHY ZINC RATES FIRST IN DIE CASTING • NUMBER 7 OF A SERIES



ease of assembly for ROCK-OLA

Much of the cost and many of the headaches involved in turning out a product like a coin operated phonograph are centered on the assembly line. Rock-Ola engineers, like those in many other fields of product engineering, minimize their assembly problems through the well-planned use of ZINC Die Castings.

The castings shown here comprise most of the exterior trim on the latest Rock-Ola Hi-Fidelity music maker. Because the unusual shapes can be die cast, the eye-catching decorative effects—highly important to the success of this product—are achieved with an absolute minimum number of components.

Since all ZINC Die Castings in a long production run are identical in size (with precisely located fastening elements) assembly is rapid and trouble-free. Furthermore, the smooth, as-cast surfaces of ZINC Die Castings require no special preparation prior to the application of beautiful, durable chromium plate by standard finishing procedures.

Other important reasons for the ever-growing popularity of ZINC Die Castings will be covered in this space in the months ahead. Send for a copy of our brochure and contact any commercial die caster for the answers to your particular production problems.

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These Jobs are done more efficiently

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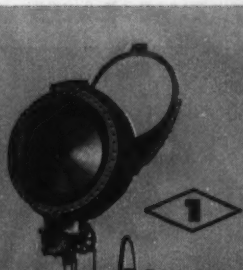

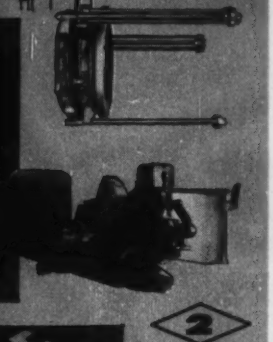

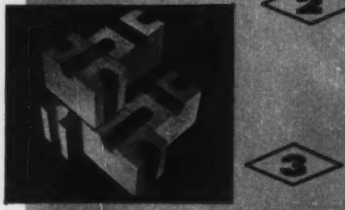

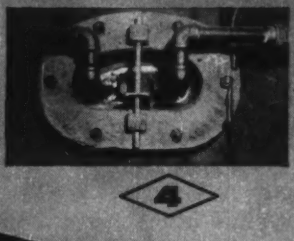

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2. **For Plugging Tapping Holes . . .** Bailey Clay Guns provide plenty of power and clay capacity for maintaining long holes.
3. **For Blast Furnace Stoves . . .** Bailey services include design, construction and relining — using Kennedy Checkers with cross-flue feature.
4. **For Cooling Blast Furnace Linings . . .** Bailey Cooling Plate Holder provides a gas- and water-tight seal, with ease of removal for inspection or replacement.
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6. **For Stopping Cinder Notches . . .** Bailey Cinder Notch Stoppers eliminate hazards to workmen at the cinder notch.
7. **For Sintering . . .** Bailey Pug Mills assure efficient pugging or mixing for blast furnace dust catchers and sintering plants. Feeder illustrated for Dust Catcher Mill maintains an even flow of the material to be processed.

Other Bailey Products: Blast Furnace Cold Blast Valve • Blast Furnace Blow-Off Valve • Check and Snort Valve • Mixing and Check Relief Valve • Fabricated Steel Stove Bottom • Precision Table Feeder • Ladle Skulling Hook

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ENGINEERS
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trick of the stylists will make the cars look longer, lower and wider.

Basic—More important will be other 1957 features. The 14-in. wheel will be introduced virtually throughout the industry to reduce unsprung weight and lower chassis another ½-in. or so. Limited slip differentials of the type introduced this year by Packard and Clipper should appear as optional equipment on many makes in 1957 as engineers move to overcome a long-standing loss of power when one rear wheel loses traction.

Pushbutton transmission selection will be just about an industry standard in 1957 models, following the Chrysler and Packard introduction this year. Fuel injection still looks too costly for adoption on 1957 jobs, but a little parsimony elsewhere could enable a manufacturer to offer it on some of his models as an option if the horsepower picture gets too tough.

Power, Power—In horsepower, 300 will be a fairly common figure by the end of this year. The Chrysler 300, upcoming in a couple of weeks, will top the 1956 industry with 340 hp or so. None of the luxury cars will be under 300 hp in 1957. Compression ratio hikes to about 11 to 1 are expected from some, such as Cadillac, and all will be close to that figure, pending new engine tooling realization, as horsepower generally moves about 30 to 40 units above 1956 model levels.

One new engine will be the American Motors V-8, which will be introduced as a running model change in the spring. It will not pretend to be a hot shot but will introduce at around 220 hp, with big promotion on fuel economy and reliability.

New Competition—A new car on the American scene in 1956 will be the German Volkswagen now being tooled in New Jersey. The hoped-for introduction date is late spring, with the plant functioning primarily as an assembly operation for German-built parts. The firm ultimately predicts sales of 250,000 units annually to the American market. U. S. builders will watch it closely, may even pick up a feature or two for their own 1957 or later models.

AUTO EXPANSION

in Millions of Dollars

1956	1800
1955	1250
1954	1295
1953	956
1952	896
1951	851
1950	510
1949	349
1948	474

The interconnected front and rear wheel suspension systems offered by Packard in 1955 will appear in a different form on other cars in 1957. GM products are ready to offer a hydro-pneumatic system similar to that of the Citroen. Ford and Chrysler are reported going similar routes.

Convertible Hardtop—Ford and other makers are reported readying a hard-top convertible that actually converts for 1957 or 1958 introduction. And automatic transmissions are in for changes in 1957 and 1958, such as the shift of Chrysler Corp. to an added gear job in 1957, a new Lincoln transmission and a new Packard unit. In all, the trend will be to greater torque multiplication with increased smoothness.

Introduction of the GMC division dream truck L'Universelle as a production item will be big news later this year. Its front-wheel drive will be a good bet for passenger cars in the distant future, since the floor-pan bulging drive shaft is eliminated.

Luxury Competition—Also to be introduced in 1956 in direct competition with the Continental is the Eldorado Brougham. Embodying many of the features of the original show car, the model should capture the fancy of many and will be a hallmark of future GM styling trends. Also upcoming shortly will be the Corvette for 1956, a sleek little job (sporting roll up windows finally) with two, four-barrel carburetors to deliver around 230 hp.

Competition

Perhaps the biggest news about the Corvette however, is a report that a team of the cars will be run at Sebring in sports car competition with something approaching factory support. Zora Duntov, regular driver at LeMans, will head the operation with Mauri Rose.

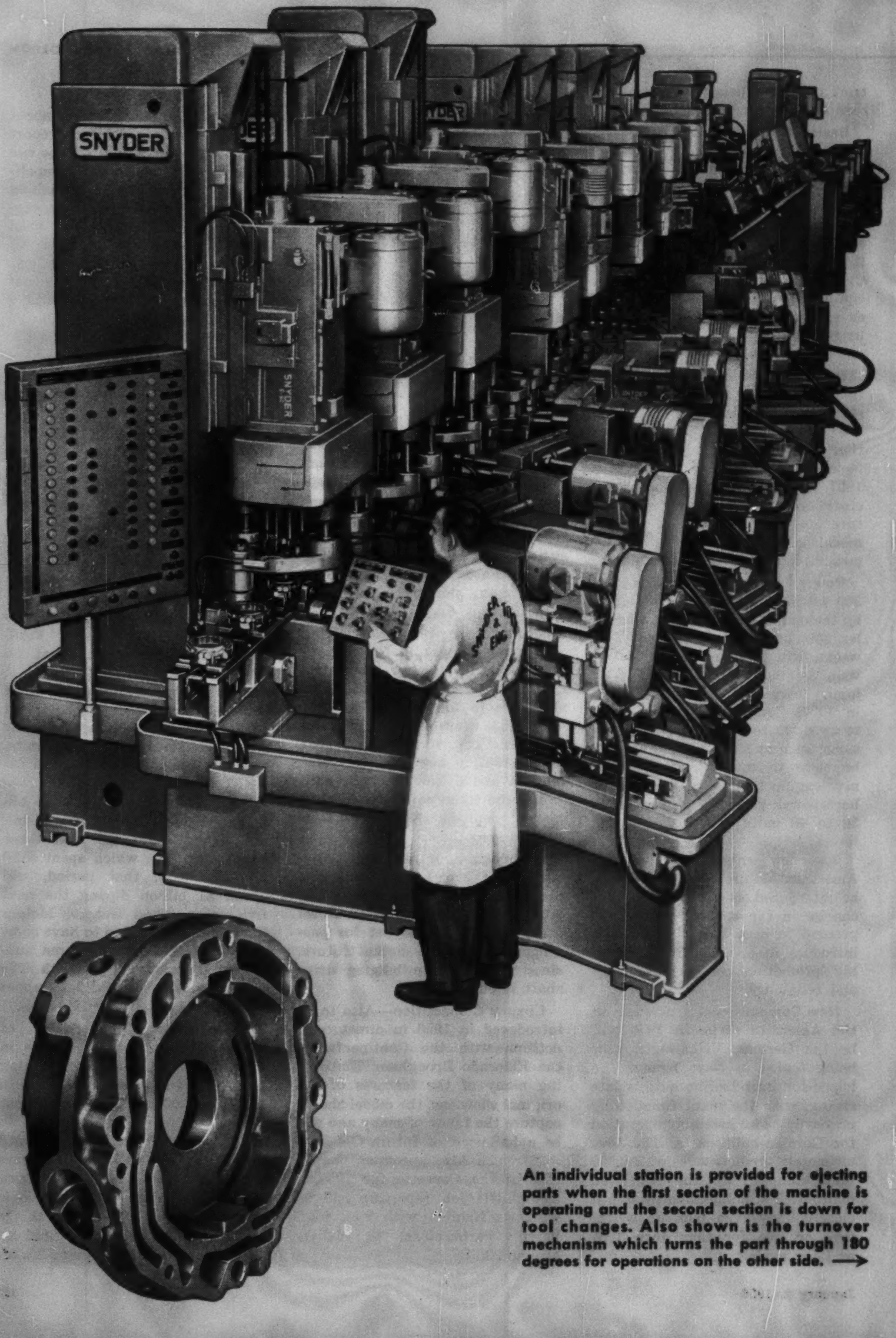
DeSoto Entry—Chrysler Corp. also is reported readying a car that will be worthy of competitive note in the sports car field, similar in concept to the Cunninghams. It is expected that DeSoto will market the car which, in addition to competitive potential, will also offer removable comfort features.

Stock car racing, almost a household word these days, will be much in evidence in the 1956 picture. It's becoming embarrassing to be beaten in the stock car circuit, and the idea is even beginning to creep in that victories may sell cars.

Different Rivalry — But the theme set by competition on the race course and in the salesroom is incidental to the behind-the-scenes competition in production. Ford, for example, reports that at no time generally during 1955 was it able to supply the demand for Ford cars despite 53-hour weeks in all 16 Ford assembly plants. Capacity has been increased 250,000 units, which is equivalent to the full capacity of many makes.

Ford, which has spent $1.65 billion since 1946, announces a $1-billion program for the next three years. Chrysler, which spent $750 million during that period, will spend $1 billion during the next five years. And General Motors Corp. can be expected to have some announcements on the same subject at Motorama this month. The money will be poured into about every facet of auto production.

Emphasis — Productivity, of course, will continue to increase, in part due to automation. A striking picture of the growth already: In 1953, 767,000 workers turned out 7.3 million cars and trucks. In 1955, only 760,000 people turned out the record 9.25 million cars and trucks. In automation, the new Plymouth engine assembly line is regarded as the hallmark of things to come. Ford reports its final assembly line will top Plymouth's ef-



An individual station is provided for ejecting parts when the first section of the machine is operating and the second section is down for tool changes. Also shown is the turnover mechanism which turns the part through 180 degrees for operations on the other side. →

SNYDER SEGMENTED AUTOMATION in 23 segment, 75 station, in-line, transfer machine permits part design flexibility, conversion to processing similar parts, limited obsolescence; drills, reams, spotfaces, chamfers, bores, counterbores, mills, taps, and automatically air gages work on automatic transmission front oil pump bodies at 144 pieces an hour at 80% efficiency.

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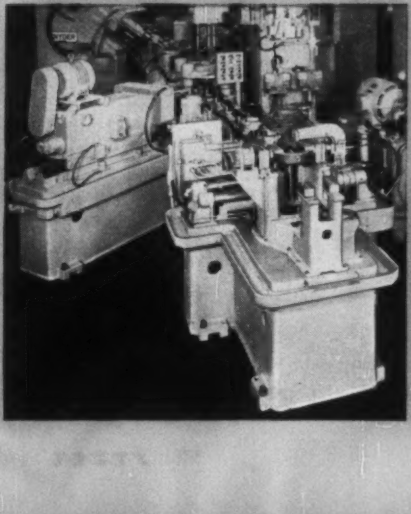
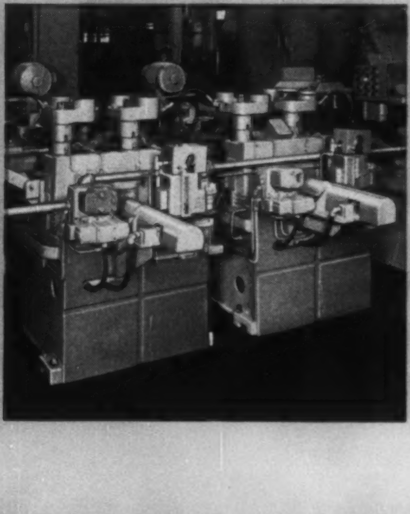
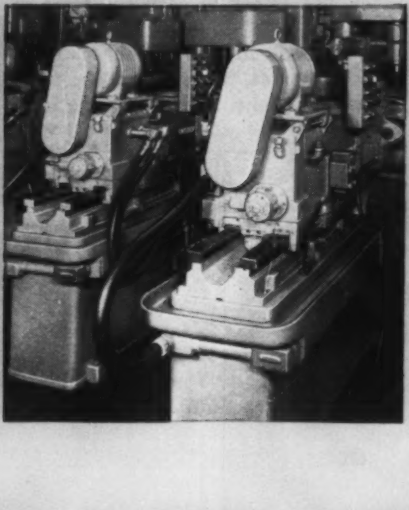
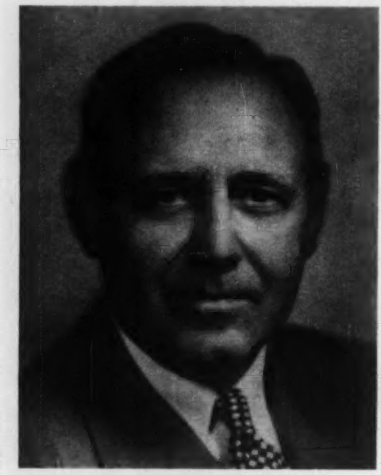


Segment bases are designed for mounting units for future operations, a feature of the flexibility and convertibility of the machine.

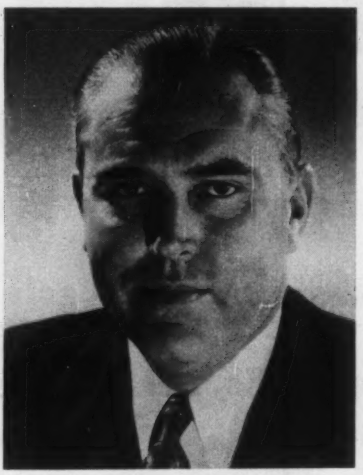


Each segment has individual push button station. Note the accessibility of tools.





JAMES J. NANCE
. . . president Studebaker-Packard Corp.



L. L. COLBERT
. . . president, Chrysler Corp.

HARLOW CURTICE
. . . president, General Motors Corp.

fort when the Lima, O., plant is ready for production. Assembly lines that index for automation are expected in auto assembly by 1959.

The trend toward V-8 engines (this year, 2 million more were sold than in 1954) promises to wend on upward in the year ahead as capacity moves to catch up with demand. Both Chevrolet and Plymouth were exceedingly short of these engines in 1955, while Ford sold 90 per cent of its cars so equipped.

Deluxe—Other items include: About 65 per cent of 1954 and 1955 cars were equipped with automatic transmissions, 28 per cent had power brakes and 22 per cent had power steering. Buyers, too, show a preference for the hard-top models. This has led many makers to schedule more than half of their production in this style.

In 1929, it took the factory worker 33.4 weeks to earn the price of a car. Today, despite the improvements which have been made in the product, he can turn the trick in 29.6 weeks. The long-range forecast of the auto industry shows only the worrysome note: There is one vehicle for every 700 ft of every lane of road in the U. S.

But already there are signs that the highway situation is easing. It is confidently predicted that a 10-million auto production year will be passed before 1960. In the over-all view, 1956, at worst, can only be a 6.5-to-7-million-unit cloud in the sunny auto climate.

"In 1956 we expect a continued high level of demand. The record number of cars sold in 1955 is not a temporary phenomenon." L. L. Colbert

"Next year will be substantially as big as 1955, at near-record levels." Henry Ford II

"The country is in the early stages of basic changes in the pattern of car ownership and use . . . We are backing our confidence in the future with a $60-million product development program by the end of 1956." George Romney

"I am confident that 1956 will be another year of prosperity for our nation and for most of the free world." Harlow Curtice

"How many automobiles can we use? The only limit is the amount of good highway mileage we provide." James J. Nance

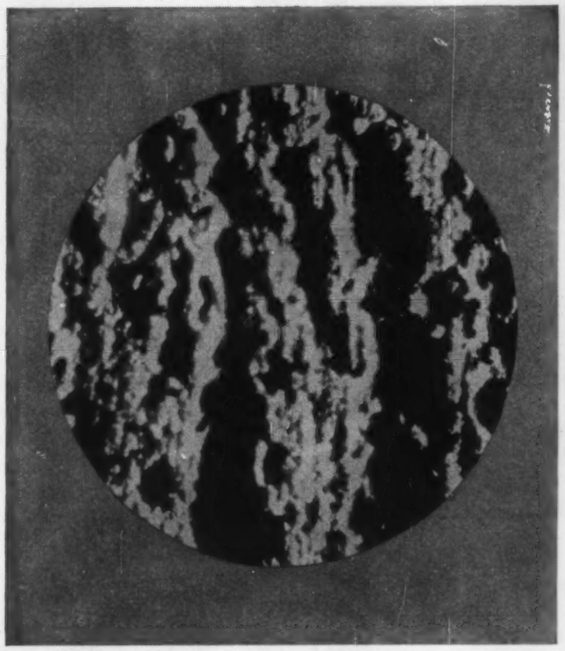
GEORGE ROMNEY
. . . president, American Motors Corp.

HENRY FORD II
. . . president, Ford Motor Co.

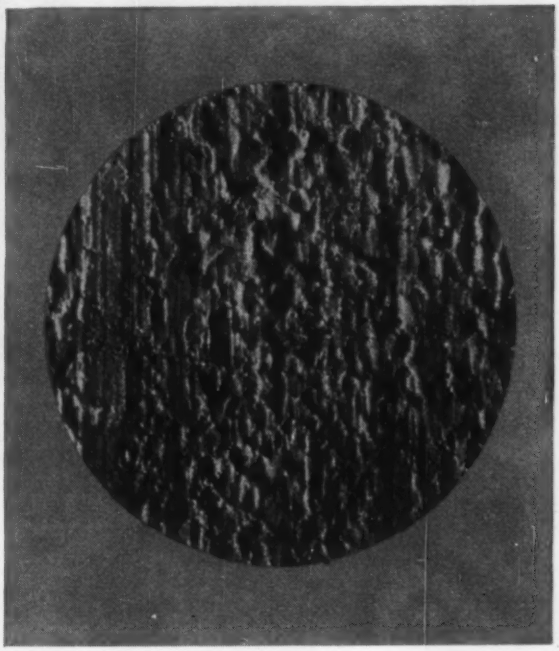
HOW RODINE CUTS PICKLING COSTS

Results demonstrate the effectiveness of Rodine® in retarding the attack of acid on the metal

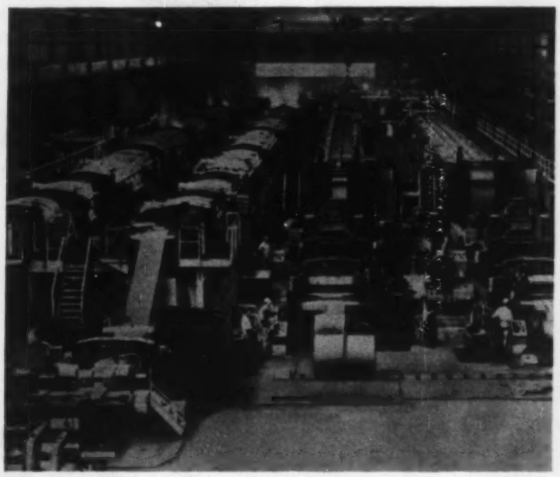
Rodine pickling acid inhibitors, when added in small quantities to acid pickling baths, retard the attack of the acid on the metal without affecting its ability to remove scale. Their effectiveness in saving acid and metal is best demonstrated by this simple comparison.



Effect of Uninhibited Acid on Steel This microphotograph shows a piece of steel which was pickled in an uninhibited acid for 5 hours. Note the deep pits and the crystalline character of the surface of the metal.



Effect of Rodine Inhibited Acid on Steel This steel was pickled exactly like the other piece, but with Rodine added to the acid solution. Only scale pockets and roll marks are visible; no pitting occurred.



A typical strip pickling installation. Rodine prevents overpickling even during line shutdowns.

In straight line pickling of wire, rod and tubing, Rodine makes available more metal for drawing. In batch pickling, Rodine improves the surface. In continuous strip pickling, Rodine prevents overpickling during line shutdowns. Wherever it is used, Rodine saves acid and metal. Our treatise on pickling and the use of Rodine, "Efficient Pickling with Rodine," gives full information. Write for your copy today.

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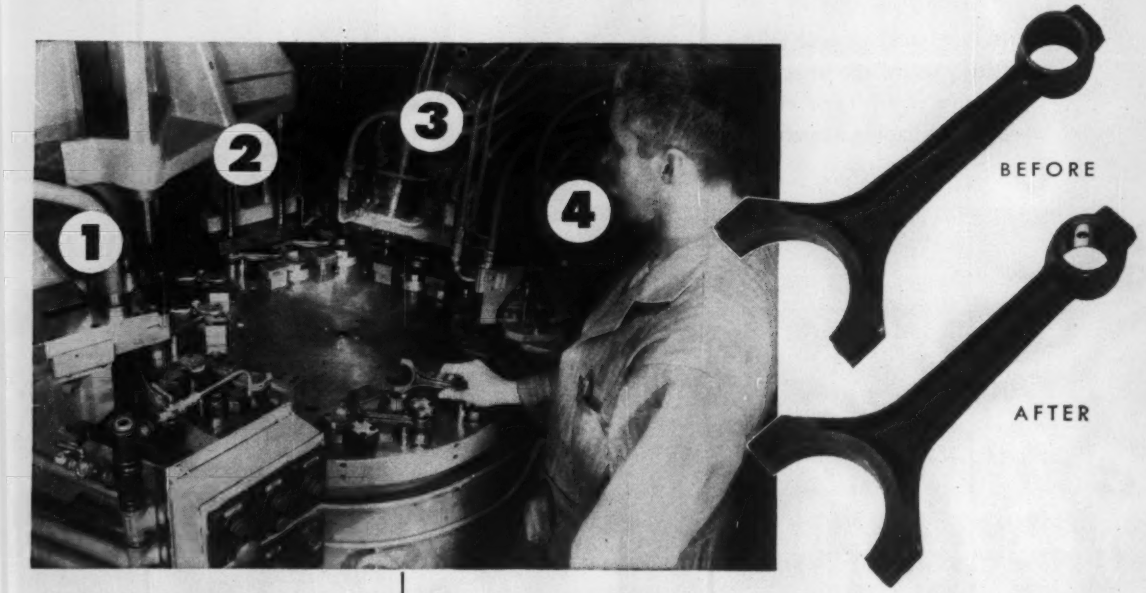
operations on 720 connecting rods per hour

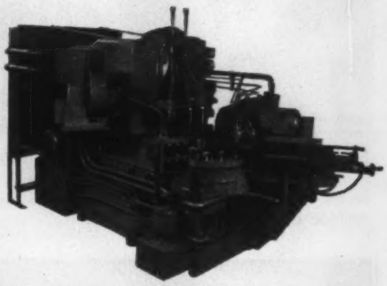


1	**ASSEMBLE WRIST PIN BUSHING**	**3**	**SPOT DRILL 1/8" OIL HOLE**
2	**BURNISH BUSHING I. D.**	**4**	**FINISH DRILL OIL HOLE**

Equipped with six, two-station locating fixtures, mounted on a rotating index base, this American machine does four operations at the rate of 720 pieces per hour (approximate at 100% efficiency).

At the first station, bushings are pressed into the wrist pin holes of the automotive connecting rods. At the next station, two American HSS burnishing tools burnish the holes and seat the bushings. The base then indexes the parts into position for two consecutive, horizontal drilling units. The first moves in to spot drill an oil hole and the second unit finish drills the hole through one wall. Operator unloads and reloads two parts at a time at the leading station.

American engineering can help you devise new and better ways to machine assemble parts — to combine operations and cut production costs. You can enlist American's long experience in this type of machine building by 'phone — or writing us details of your requirements. Why not do it today?



Note hopper feed and fully automatic push-button control.

Write for this new manual of broaching and machine assembly. Ask for Catalog 450.

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A DIVISION OF SUNDSTRAND MACHINE TOOL CO.

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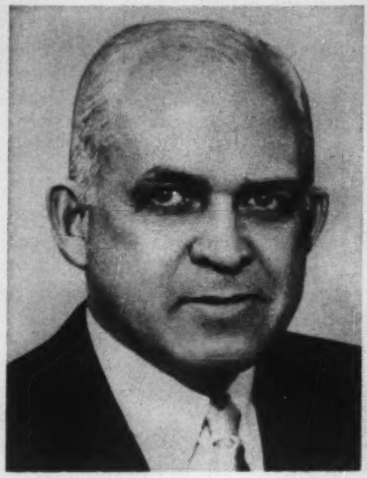
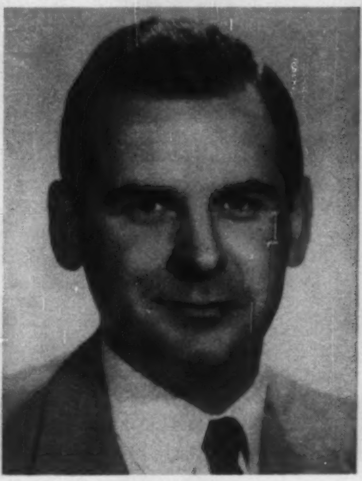
MEN OF INDUSTRY



EDWIN R. BRODEN
. . . heads SKF Industries



GEORGE B. MOSELEY
. . . Chase Brass & Copper v. p.-sales

WILLIAM E. JUDD
. . . U. S. Machine Div. gen. mgr.

Edwin R. Broden was elected president and chief executive officer of **SKF Industries Inc.**, Philadelphia. He succeeds **Richard H. DeMott**, who continues as chairman of the board. Mr. Broden joined SKF in the spring of 1955 as executive vice president. He was executive vice president of Carborundum Co.

Charles C. McCarthy fills the new position of aluminum product manager at **Whitehead Metal Products Co. Inc.**, with headquarters in New York.

Duff-Norton Co., Pittsburgh, named **Richard G. Nolte** vice president and assistant to the president. He was plant manager for Crescent Industries Inc.

Tennessee Coal & Iron Division, Birmingham, U. S. Steel Corp., appointed **John W. Todd Jr.** general manager of sales to succeed **Richard J. Stakelum**, retired. Mr. Todd was assistant general manager of sales-administrative. Effective Jan. 31, **Roy C. Rhodes**, now Houston district sales manager, will succeed **George C. Bruner**, retiring, as assistant general manager of sales, eastern area.

William Krause Jr. was made sales and service manager for **McEvoy Co.**, Houston.

George B. Moseley was appointed vice president-sales, **Chase Brass & Copper Co. Inc.**, Waterbury, Conn., a subsidiary of Kennecott Copper Corp. He was general sales manager of Firestone Steel Products Co. of Firestone Tire & Rubber Co. Mr. Moseley succeeds **Bruce A. Dean**, resigned.

Robert B. Keegan was made sales manager, industrial and specialty sales division, **Tempo Products Co.**, Cleveland.

Raymond J. Herkert was made sales manager, steel mill division, **Phoenix Mfg. Co.**, Joliet, Ill.

R. Grant Whitehead was made sales manager of **Claude B. Schneible Co.**, Detroit. He was assistant to the sales manager.

W. G. Frank, executive vice president, was named president of **American Air Filter Co. Inc.**, Louisville. He succeeds **W. M. Reed**, now chairman of the board, a new post. **Ben R. Shaver**, secretary-treasurer, was made vice president - treasurer, and **E. G. Mason** was made secretary.

Maurice B. Keady Jr. was made manager of metallic molybdenum sales for **Climax Molybdenum Co.**, New York. He was with International Nickel Co.

William E. Judd, effective Jan. 9, will be general manager of Stewart-Warner Corp.'s **U. S. Machine Division**, Lebanon, Ind. He succeeds **Carl J. Winkler Sr.**, retiring. Mr. Judd, since June, 1954, has been assistant to Bennett Archambault, president of Stewart-Warner.

James F. Ackerman was elected vice president of **American Brass Co.** with headquarters at Waterbury, Conn. He was vice president in charge of the Torrington, Conn., division. **William C. Knoeppel**, manager at Torrington, becomes vice president of that division. **Frank H. Ballantyne** was made vice president, French Small Tube Division, at Waterbury to succeed **Leon H. French**, retired. **Scott H. Patterson** succeeds **Frederick K. Swigert**, retired, as vice president in charge of the Buffalo division.

Pratt & Whitney Co. Inc., West Hartford, Conn., appointed **Irwin F. Holland** special assistant to the manager of the cutting tool and gage divisions. **Edward J. Shages** becomes factory manager of the divisions.

F. A. W. Anger was appointed director of manufacturing at **Axelson Mfg. Co.**, division of U. S. Industries Inc., Los Angeles. For the last 18 years he has been with Kaiser organizations in construc-

PHILIP RYAN
. . . heads Cutler-Hammer Inc.

WADE S. PLUMMER
. . . Automatic Transportation gen. supt.

EDWARD R. COUCH
. . . Le Roi stationary compressor mgr.

tion, shipbuilding and automotive manufacturing.

Philip Ryan was elected president and chief executive officer of **Cutler-Hammer Inc.,** Milwaukee, to succeed **G. S. Crane,** now chairman of the board and chairman of the newly created plans committee. Mr. Ryan was executive vice president and vice president in charge of manufacturing and development engineering. **J. C. Borden,** controller, was elected vice president-controller.

Thomas G. Bishop was made sales manager, plastic machinery division, **Hydraulic Press Mfg. Co.,** Mt. Gilead, O. He was assistant manager of the eastern office in Teaneck, N. J.

Signode Steel Strapping Co., Chicago, appointed **Joseph F. Beckman** assistant director of sales and manager of steel industry sales. He was sales manager of the New Orleans region.

Wade S. Plummer was made general superintendent of **Automatic Transportation Co.,** Chicago. He is in charge of manufacturing. Formerly with the Pennsylvania Railroad in Chicago, Mr. Plummer succeeds the late **Albert Salt.**

Gerald M. Scheufler was made sales engineer in the Chicago area for **Eaton Mfg. Co.'s** Reliance Division. He was an assistant purchasing agent with Bastian Blessing Co.

Dean C. Smith was elected vice president - manufacturing at the Aurora, Ill., Works of **Thor Power Tool Co.** He was general manager.

Le Roi Division, Westinghouse Air Brake Co., Milwaukee, appointed **Edward R. Couch** manager of stationary compressor sales. He was assistant product sales manager.

C. Parke Anderson was made general sales manager, **Thomas Truck & Caster Co.,** Keokuk, Iowa. He was assistant sales manager.

William F. Huber was elected vice president, **Southwestern Ohio Steel Inc.,** Hamilton, O. **James O. Barnthouse** was elected secretary-treasurer.

Robert E. Sanford was made design engineer, **Erie Foundry Co.,** Erie, Pa. He was associated with Clearing Machine Corp. as forging consultant.

Don M. McPherson was made general manager of **Willey's Carbide Tool Co.,** Detroit. Before joining Willey's in 1953, he was with Ex-Cell-O Corp.

American Cast Iron Pipe Co., Birmingham, promoted: **Carl Farlow** to chief engineer; **Sam F. Carter** to assistant works manager; **Ralph Carlson** to melting superintendent and **James W. Moore Jr.** to assistant melting superintendent; **W. W. McCulloch** to sales manager and **T. E. Rybka** to assistant sales manager of special products. Effective Apr. 1, when **Dr. James T. MacKenzie,** technical director, retires, **J. T. Vann** (now assistant works manager) will succeed him. **C. K. Donoho** (now chief metallurgist) will become assistant technical director and metallurgist.

Kenneth P. Bellinger recently resigned as executive vice president of Chemical Corp., Springfield, Mass., to form his own company, **Conversion Chemical Corp.,** Rockville, Conn. The new organization will deal in specialty cleaners and treatments for the metal finishing industry and represent manufacturers of metal finishing equipment.

T. W. Griffiths was appointed general manager of **Vinnell Steel,** a division of Vinnell Co. Inc., Baldwin Park, Calif. **Rene Pfister** was made production manager and **Robert V. Lindberg** general sales manager.

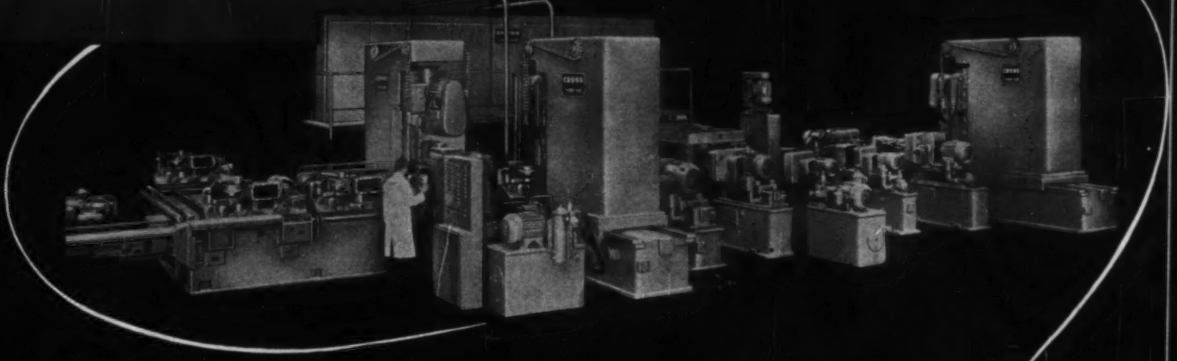
George R. Galbraith was made assistant vice president of **Walworth Co.,** New York. In addition to his new duties, he continues in charge of Walworth marine sales and specialty products.

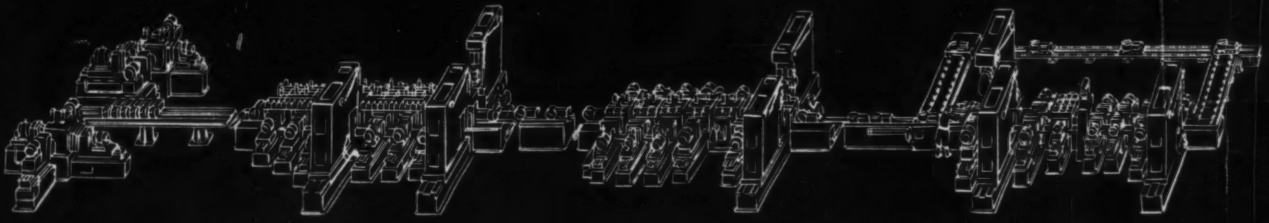
Harvey S. Vincent was elected vice president-sales, **Tammen & Denison Inc.,** consulting engineers of Chicago. During the last decade, he established two engineering organizations. He was president of Midland Product Engineering, Detroit; and, until joining Tammen & Denison, was president of National Crown Engineering & Mfg. Co., Philadelphia.

Alfred L. Trumpler was made pro-

Tractor Differential Housings from Rough Castings to Assembly!

Another Transfer-matic by Cross





The new Cross Special Machine above is one of four sections which constitute a complete production line. Together, they process 46 tractor differential housings per hour from rough foundry castings to assembly. The line is 225 feet long with 31 stations. It performs 313 operations, including 19 milling, 7 cross-facing, 110 drilling, 17 boring, 72 chamfering, 4 spot-facing, 8 reaming and 76 tapping.

Like all Cross machines, the parts—even tooling details—are made to interchangeable tolerances for fast, easy maintenance and to provide flexibility for model changes—an important Cross advantage both from the standpoint of operating costs and investment. This production line is another example of Cross Sectionized (Segmented) Automation.

Established 1898

THE CROSS CO.

First in Automation

DETROIT 7, MICHIGAN

LAWSON VAN RIPER
. . . American Brass division v. p.

PHELPS H. ADAMS
. . . directs U. S. Steel public relations

THOMAS C. FOGARTY REUBEN L. PERIN
. . . executive promotions at Continental Can

motion manager of **Harper Electric Furnace Corp.**, Buffalo.

Thomas C. Fogarty was elected president, **Continental Can Co.**, New York, to succeed **Hans A. Eggerss**, retired. **Reuben L. Perin** succeeds Mr. Fogarty as executive vice president in charge of the metal division. Other metal division promotions: **Orren R. McJunkins**, general manager-southeastern district, succeeds Mr. Perin as vice president in charge of the eastern division. **Horace M. Blinn**, general manager-California district, Pacific division, was elected vice president in charge of that division to fill a vacancy created by retirement of **Sherlock McKewen.**

Townsend Co. transferred **William F. Arnoldy**, application engineer, from its technical sales department at New Brighton, Pa., to the aircraft sales division, Santa Ana, Calif. He will provide technical liaison with the aircraft industry in the U. S. and Canada.

Tom L. Kalahar was made sales manager, **Sterling Hardware Mfg. Co.**, Chicago. He was regional sales manager of McKinney Mfg. Co., sales manager of Hull Mfg. Co. and district manager of United States Rubber Co.

Lawson van Riper was elected vice president of the Ansonia, Conn., division of **American Brass Co.** He succeeds **Arthur W. Wilkinson**, retired. Mr. van Riper was manager of the division.

Phelps H. Adams was elected executive director-public relations and assistant to the chairman of the board of **United States Steel Corp.**, New York. He succeeds **J. Carlisle MacDonald** who organized the public relations department in 1936. **Charles W. Huse** was made director-public relations administration and **Fred LePell** becomes assistant director. Mr. Adams joined the public relations staff in 1950 as a special assistant to Mr. MacDonald.

Walter B. Panko, since 1952 sales manager of Crofoot Nielsen Co., joined Hyprez Division of **Engis Equipment Co.**, Chicago. He will assist Joseph M. Throckmorton, sales manager, in maintaining contact with representatives throughout the U. S.

Eaton Mfg. Co., Cleveland, named **Sidney Oldberg** director of automotive research at Detroit and **Andrew S. Gill Jr.**, manager, central research division, Cleveland.

Morgan Engineering Co., Alliance, O., appointed **Edwin H. Burke** chief engineer, mills and machinery; **Luther E. Romoser**, chief proposal engineer; **George M. Hoffman**, chief electrical engineer; **Irwin W. Evans**, chief development and welding engineer; and **Percy Stockburger**, acting chief crane engineer.

John Hallett was elected a vice president, **Kaiser Engineers Division**, Henry J. Kaiser Co., Oakland, Calif. He was vice president in charge of aircraft production, Kaiser Metal Products Inc.'s plant, Bristol, Pa.

Theodore A. Rapp was made industrial sales manager at **R. Hoe & Co. Inc.**, Bronx, N. Y. He will manage the recently organized contract manufacturing division and will develop new product lines.

William R. Boan was made production manager of **Northeastern Steel**

Only Kearney & Trecker has Twin Screw Knee Support

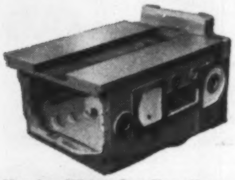
Now TF Series milling machines give you broad and equal distribution of all work loads ...prolonged economy at critical points ...unmatched rigidity under heavy cuts

KEARNEY & TRECKER's new line of TF Series Plain, Universal and Vertical milling machines gives you a combination of more outstanding design and operating features (illustrated below) than any other knee type milling machine on the market today.

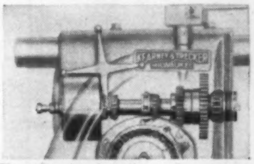
Among these features is the *exclusive* Kearney & Trecker TWIN SCREW KNEE SUPPORT design — the *double support* arrangement that distributes most effectively the weight of much larger, heavier knees, saddles and tables. This *balanced design* substantially increases stability under the heaviest loads... offers greater resistance to torsional thrust under all cuts... divides the wear factor in half thus assuring greater, longer-lasting accuracy.

The new TF Series line of production milling machines is available in five sizes — No. 2 to No. 6 from 10hp to 50hp. For complete specifications, and what these TF's can do for you, see your nearest Kearney & Trecker representative, or write direct to Kearney & Trecker Corp., Milwaukee 14, Wis.

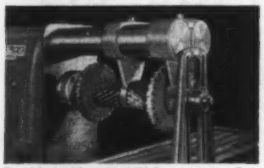
5 more reasons why TF Series milling machines are way out front in rigidity



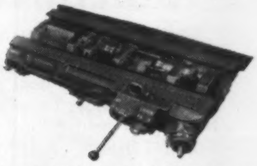
Heavier, Wider, One-Piece Knee — The TWIN SCREW arrangement supports the heavier, larger knee. Span and length of ways is increased considerably, providing fuller saddle support . . . lasting accuracy . . . substantial reduction of way and gib wear.



Three-Bearing Spindle — Complete assembly consists of three heavy-duty bearings, flywheel, a train of wide-faced forged steel gears. Rigidity of spindle unit contributes to increased cutter life, better finish and quieter operation.



Double "Vibra-Void" Overarms — Two solid steel bars, mounted completely through column, void vibration at source, afford more rigidity and resistance to deflection than any other type support. Design also greatly simplifies changing of arbors and cutters.



"Fron-Trol" Operating Convenience — Front-mounted controls include feed selection, Mono-Lever table feed and rapid traverse, automatic cycle table feed and rapid traverse controls, table handwheel, saddle clamping gib and backlash eliminator. Machines have 2" dia. table feed screw.

Massive Column — Solid back, double-box section column is scientifically ribbed throughout to rigidly withstand heaviest cutting forces. Full bearing column face affords maximum support for the knee. Cross-mounted motor assures maximum ventilation, easy access for routine maintenance.

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MILWAUKEE

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BUILDERS OF PRECISION AND PRODUCTION MACHINE TOOLS SINCE 1898

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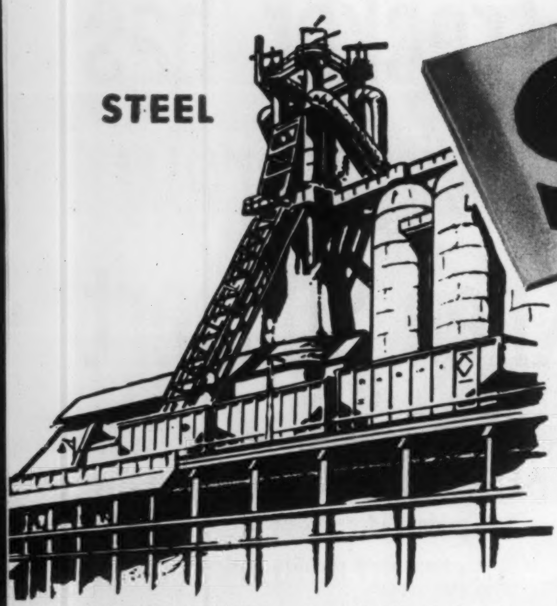
Please send me Catalog No. TF-50 with details on new line of TF Series Plain, Universal and Vertical milling machines.

Name.....
Title.....
Company.....
Address.....
City..... Zone..... State.....

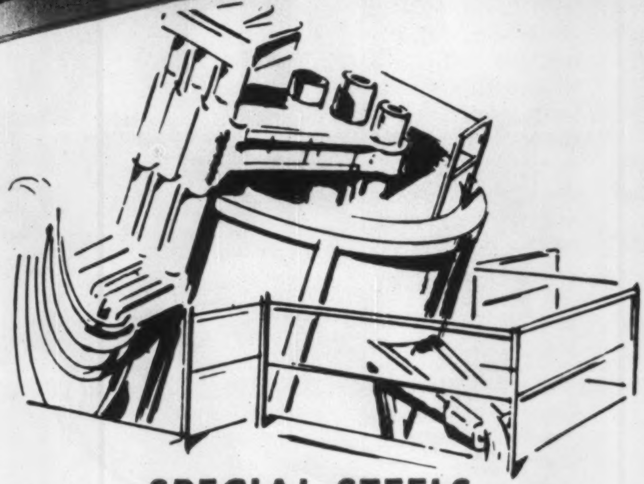
SHARON

STEEL



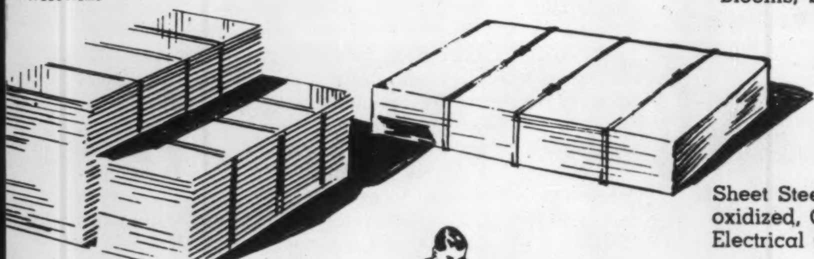
ROEMER WORKS — Farrell, Pennsylvania
Steel Manufacturing Division: Pig Iron, Open Hearth Ingots, Blooms, Slabs, Billets, Sheet Bar and Plates. Finishing Division: Carbon, Alloy and Stainless Hot and Cold Rolled Strip Steel, Black, Pickled and Coated Strip Steel, Sharon Galvanite* Sharonart, Special Alloy Coated, N. A. X. and Cor-Ten Strip Steels.

*Trade Name



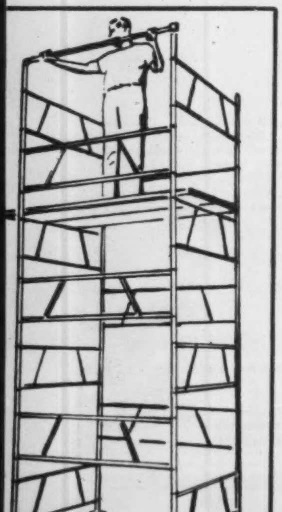
SPECIAL STEELS

LOWELLVILLE WORKS — Lowellville, Ohio
Pig Iron, Open Hearth and Electric Furnace Ingots, Blooms, Slabs, Sheet Bar, Billets and Plates.



SHEETS

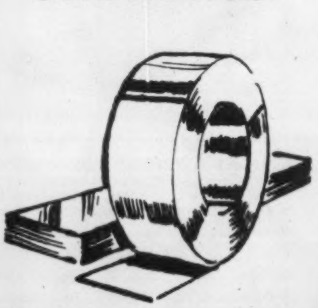
Sheet Steel — Hot Rolled, Pickled, Annealed, Deoxidized, Galvanized, Galvanite, Long Terne and Electrical Grades.



STEEL STRAPPING

BUILDING PRODUCTS

BRAINARD STEEL DIVISION — Warren, Ohio
Tensional Steel Strapping, Heavy Duty Strapping, Strapping Tools and Accessories, Electric Welded Steel Tubing, Tel-O-Posts, Steel Strong Posts, Brite-Lite and Standard Areawalls, Roll-Formed Steel Lintels, Anti-Checking Irons, Brainard Scaffolding.



STRIP STEEL

DETROIT TUBE & STEEL DIVISION
Detroit, Michigan
Cold Rolled Strip Steel, Low Carbon — High Carbon, N. A. X. and Cor-Ten Strip Steel.

SHARON STEEL CORPORATION
Sharon, Pennsylvania

SHARONSTEEL

WAREHOUSES

SHARONSTEEL
PRODUCTS DIVISION
Farrell, Pennsylvania
Warehouse Distributors.

COAL

JOANNE
COAL
COMPANY
Rachel,
West Virginia
Coal

TITANIUM

MALLORY-SHARON
TITANIUM CORPORATION
Niles, Ohio
Sheet, Strip, Forged Rod, Bar, and
Billet Stock, Rolled Rod and Bar.

COKE

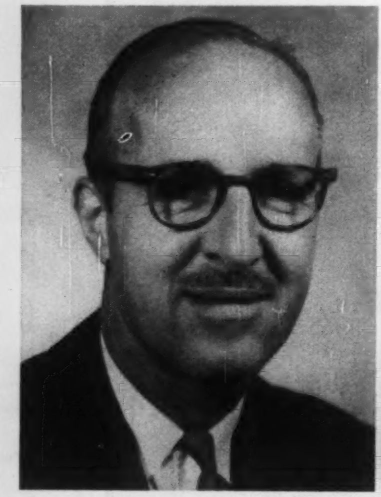
CARPENTERTOWN COAL & COKE CO.
Mt. Pleasant, Penna.—Coal and Bee-Hive Coke
FAIRMONT COKE WORKS—Fairmont, W. Va.
By-Product Coke

TRUCKING

STEEL TRUCKING, INC.—Detroit, Michigan—Transportatio

Sales Offices

Chicago, Cincinnati, Cleveland, Dayton, Detroit, Grand Rapids, Indianapolis, Los Angeles, Milwaukee, New York, Philadelphia, Rochester, San Francisco, Sharon, Seattle, Montreal, Que., Toronto, Ont.



DONALD L. PRICE

GEORGE A. PARK

FRED L. CURTIS

. . . Norton Co. appoints sales managers for product lines

Corp., Bridgeport, Conn. He was with Atlas Steels Ltd.

Harry M. Clarke, manager of commercial research of **Bliss & Laughlin Inc.,** Harvey, Ill., was elected vice president and was made general manager of the Detroit plant. He is succeeded by **Bertil E. Anderson.**

Hugh S. Ferguson, president of Dewey & Almy Chemical Co., division of **W. R. Grace & Co.,** New York, was named executive vice president in charge of the chemical group in the parent company.

Norton Co., Worcester, Mass., appointed **Donald L. Price** sales manager, grinding wheels; **George A. Park,** sales manager, abrasives; **Fred L. Curtis,** sales manager, new products; and **Harlan T. Pierpont,** sales manager, refractories.

David G. Hill was elected president, **Pittsburgh Plate Glass Co.,** Pittsburgh. He succeeds **Harry B. Higgins,** who was made chairman of the board to succeed **Clarence M. Brown,** retired. Mr. Brown was elected honorary chairman and continues as a director. **Ralph V. Reisgen** was elected vice president-glass manufacturing, succeeding Mr. Hill.

Ken Grearson was named manager of the Chicago district office of **Granco Steel Products Co.,** subsidiary of Granite City Steel Co.

Frederick C. Sheppard was elected treasurer of **Bristol Brass Corp.,** Bristol, Conn., to succeed **Carl A. Gustafson,** retired.

Gilbert R. Semans was made assistant director of metallurgy and research at **Jessop Steel Co.,** Washington, Pa.

Donald C. Duvall was elected vice president-industrial relations, **Pittsburgh Steel Co.,** Pittsburgh. He succeeds **Garrett A. Connors** who continues as an industrial relations consultant. **Carl A. Breuer,** assistant to the vice president-operations, was made general manager-operations. At the Monessen, Pa., Works, **Edward A. Dawson,** division superintendent of rolling mills, replaces Mr. Duvall as works manager. **Albert Lami** becomes assistant works manager; **Kenneth Geiselhart,** superintendent of blooming and bar mills; and **C. H. Williams,** superintendent, wire and rod mills. **T. F. Jenion,** works metallurgist at the Allenport, Pa., Works, becomes assistant works manager there.

DONALD C. DUVALL

CARL A. BREUER

. . . appointments at Pittsburgh Steel Co.

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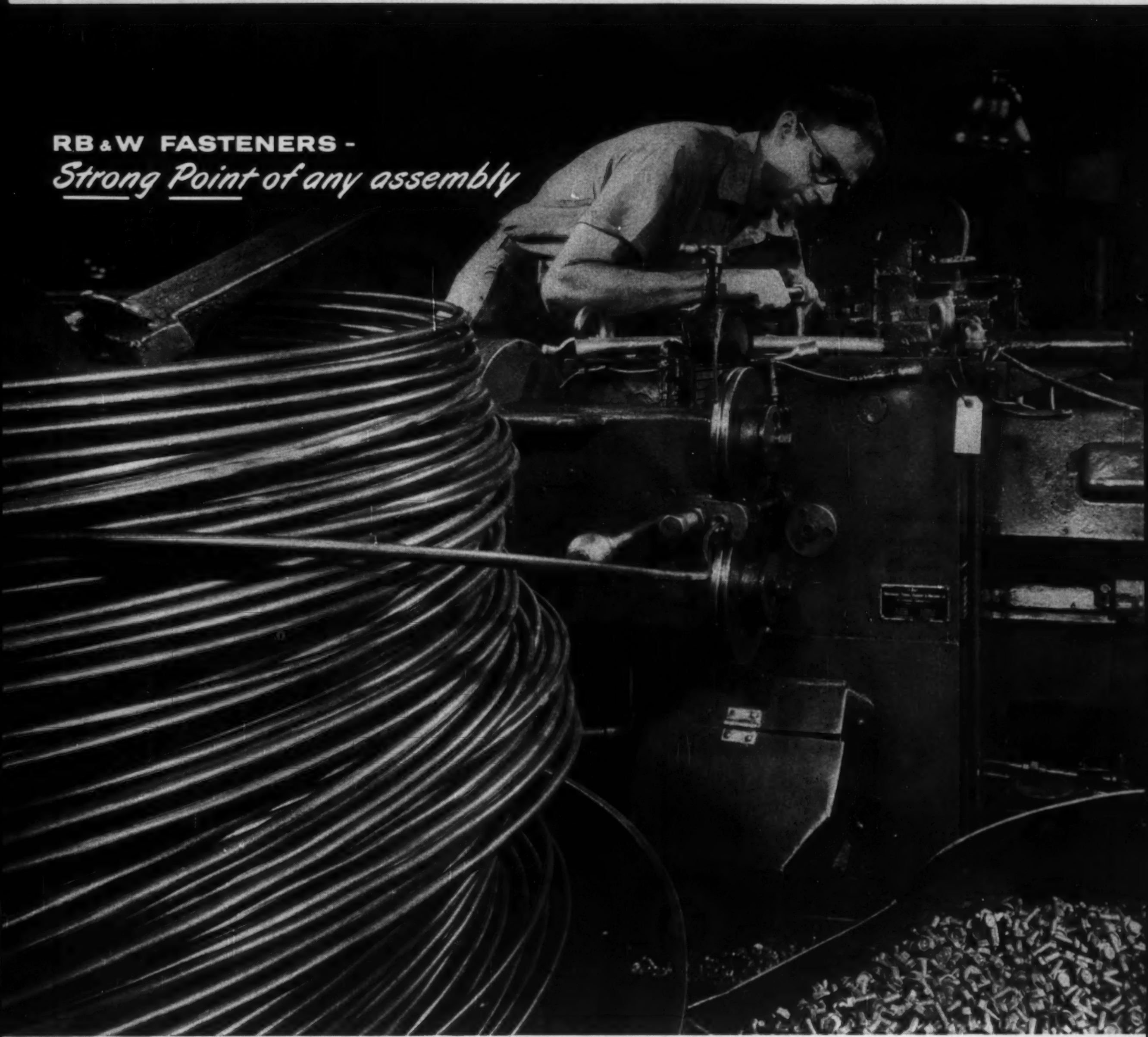
RB&W FASTENERS -
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Getting set to pound some strength into bolt heads

Here are three essentials for producing strong, low cost fasteners . . . an ingenious machine, indispensable skill and proper material.

That's a cold header you see. It deals wire terrific blows, forcing it to flow cold inside dies. Skillfully set up, it spills out bolt or screw blanks by the thousands per hour—all with *strong*, sound heads.

Making precise adjustments on the machine is Douglas Dunaway. With RB&W for ten years, he's one of many long-timers whose experience assures high quality output from a vast array of modern equipment.

The cold heading method (an RB&W development that revolutionized bolt making) calls for use of uniform, high quality raw material. With constant quality control, RB&W makes *sure* cold headers get the proper "diet".

It's this combination of facilities, experience and quality control in all RB&W plants that assures more fastener quality for your money . . . a truly reliable supply source . . . and strong fasteners that never let you down.

Russell, Burdsall & Ward Bolt and Nut Company, Port Chester, N. Y.

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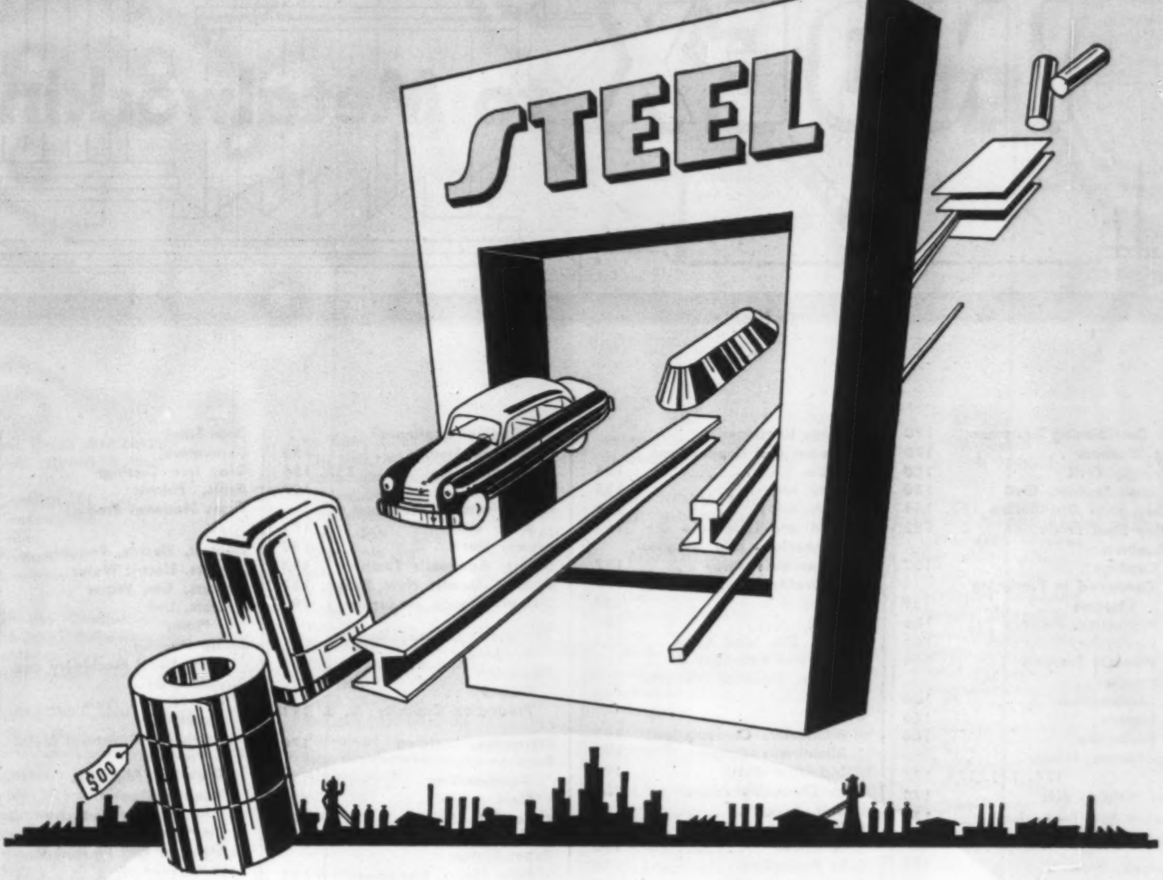
110th year

Plants at: Port Chester, N. Y., Coraopolis, Pa.; Rock Falls, Ill., Los Angeles, Calif. **Additional sales offices at:** Ardmore (Phila.), Pa.; Pittsburgh; Detroit; Chicago; Dallas; San Francisco. **Sales agents at:** Milwaukee; New Orleans; Denver; Seattle. **Distributors** from coast to coast.



1956 METALWORKING FACTS and FIGURES

• This is the eighth annual edition of Metalworking Facts and Figures. This 48-page section is designed to give you in one package the figures you need on production, sales, labor, prices and earnings in metalworking—the world's biggest industry.

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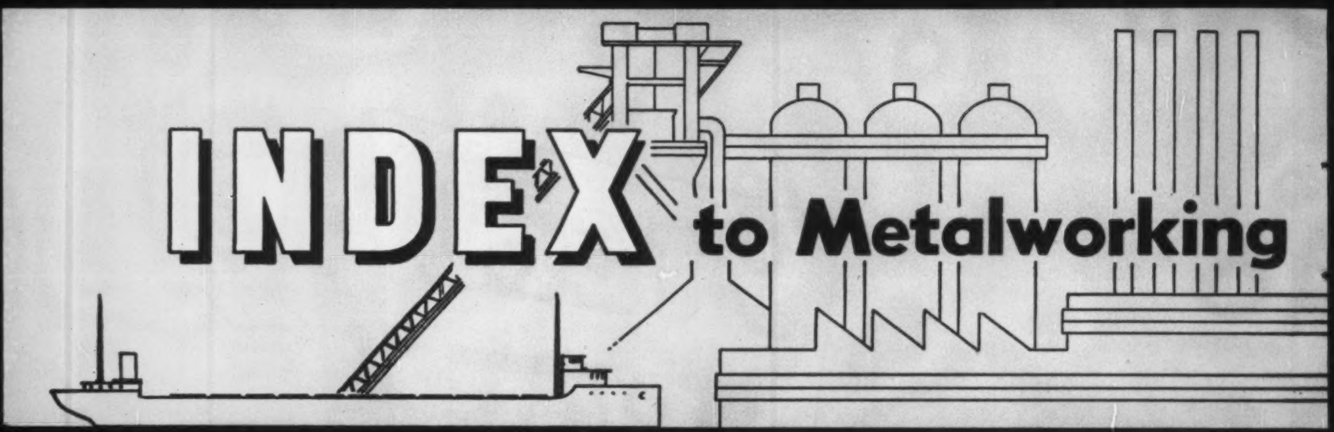

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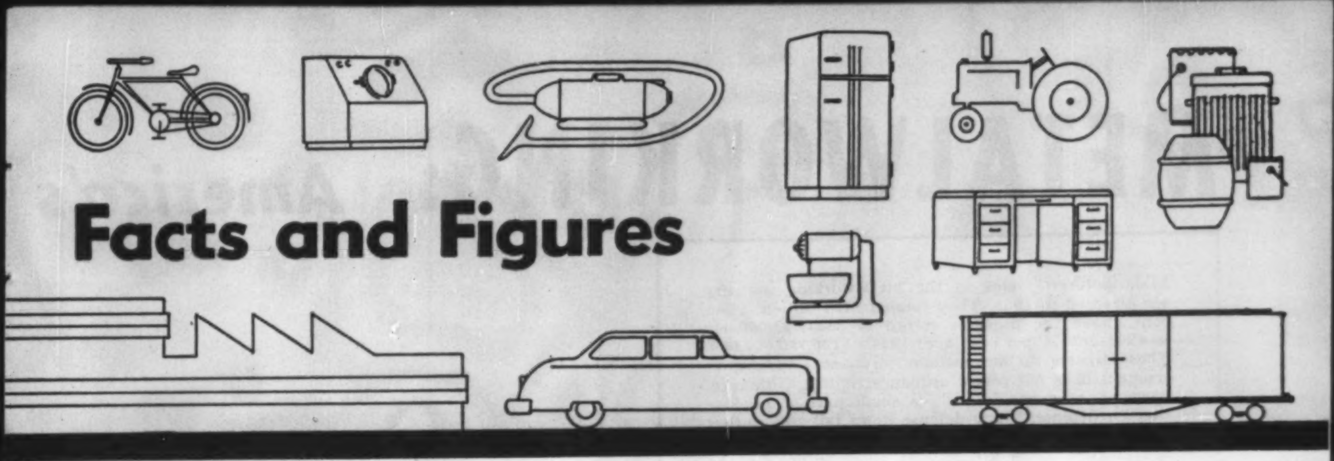

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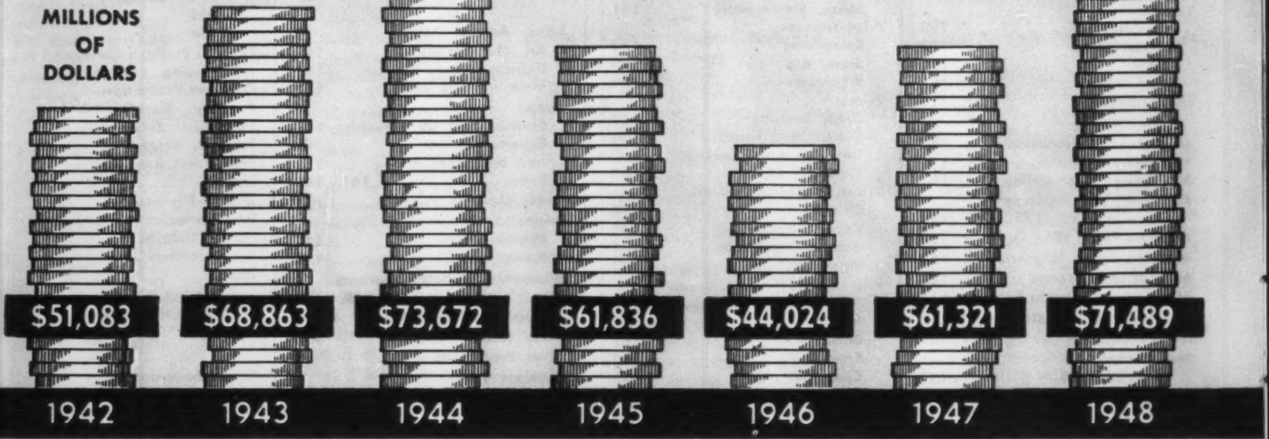
METALWORKING: America's

Manufacturers' sales in the metalworking industry set a record in 1955. They totaled $128 billion, 5 per cent above the previous record of $121,793,000,000 in 1953 and 20 per cent over 1954's $106,789,000,000. These figures do not include "ordnance." The government does not reveal ordnance figures. Ordnance, however, accounts for only a small part of production for defense. Many defense items fall under other classifications, such as transportation equipment or instruments. Data are revised compilations by the Office of Business Economics, U. S. Department of Commerce, with 1955 estimated by STEEL.



MANUFACTURERS' SALES IN METALWORKING INDUSTRY†

(Millions of Dollars)

New Standard Industrial Classifications	Primary Metals	Fabricated Metal Products	Machinery	Transportation Equipment	Instruments	TOTAL Metalworking Industry
1955*	25,708	15,745	40,410	41,647	4,490	128,000
1954	19,749	13,862	37,775	32,283	3,120	106,789
1953	24,043	15,004	41,580	37,958	3,208	121,793
1952	20,725	13,625	38,402	29,582	2,886	105,220
1951	23,087	13,655	33,989	25,606	2,702	99,039
1950	19,046	11,710	27,114	22,651	2,486	83,007
1949	14,743	9,160	22,369	18,717	1,978	66,967
1948	17,153	10,200	24,618	17,475	2,043	71,489

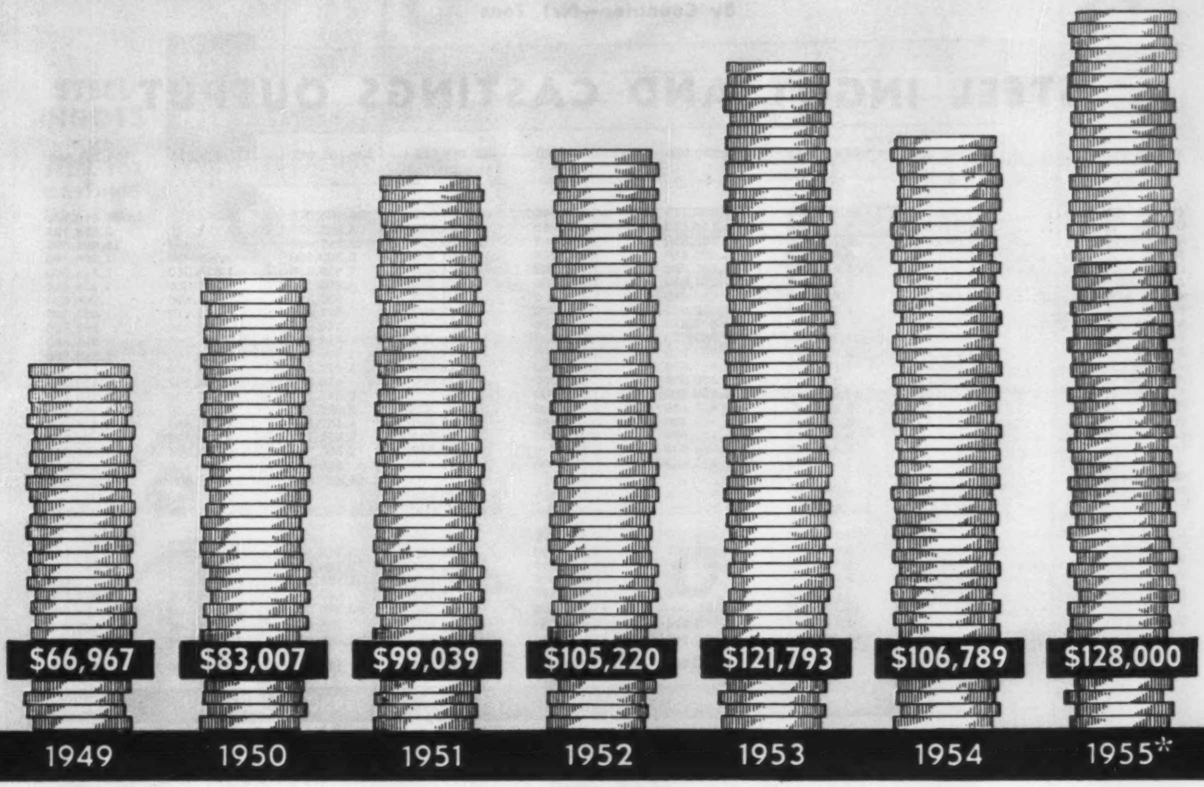
Former Industry Group Classifications	Iron-Steel and Products	Nonferrous Metals and Products	Electrical Mach. and Equipment	Machinery Except Electrical	Automobiles and Equipment	Trans. Equip. Except Automobiles	TOTAL Metalworking Industry
1948	22,188	5,946	9,024	15,658	13,662	3,818	70,296
1947	19,172	5,633	8,299	13,697	11,478	3,042	61,321
1946	14,202	4,705	5,658	9,824	6,624	3,011	44,024
1945	16,812	4,463	6,302	11,640	11,446	11,173	61,836
1944	17,795	4,755	7,104	12,907	15,096	16,015	73,672
1943	16,772	4,595	5,734	12,286	13,422	16,054	68,863
1942	14,563	3,411	4,550	10,370	7,956	10,233	51,083

---

†Figures for 1948 and later represent a shift to the Standard Industrial Classification system. Data for 1948 are presented on the old industry group classification as well as the new.

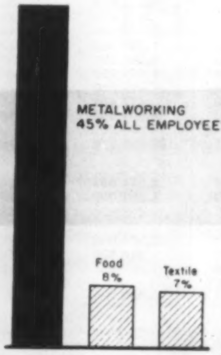
*Estimate for 1955 is by STEEL. Figures for other years (except instruments) are from Office of Business Economics. Instruments figures for 1950 through 1954 are estimated by STEEL.

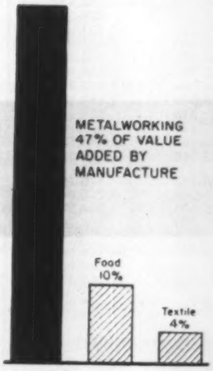
Greatest Industry



*Estimated.

HOW METALWORKING TOWERS OVER OTHER MANUFACTURING INDUSTRIES





Standard Industrial Classifications	TOTAL NUMBER PLANTS*	NUMBER OF EMPLOYEES*	VALUE Added by Manufacture (Thousands)†
20. Food and Kindred Products....	36,318	1,379,627	$11,937,510
21. Tobacco Manufactures	762	87,608	987,073
22. Textile Mill Products	9,084	1,184,845	5,411,769
23. Apparel and Related Products..	31,380	1,267,446	5,414,627
24. Lumber and Products	42,591	735,750	3,500,524
25. Furniture and Fixtures	10,073	372,037	2,046,805
26. Paper and Allied Products	4,837	519,889	4,463,237
27. Printing and Publishing	31,836	781,217	5,916,432
28. Chemicals and Allied Products.	11,798	775,839	9,320,348
29. Petroleum and Coal Products ..	1,592	226,429	2,795,373
30. Rubber Products	1,196	271,516	2,021,443
31. Leather and Leather Products .	5,296	391,730	1,711,066
32. Stone, Clay and Glass Products.	11,558	520,025	3,752,912
33. Primary Metal Industries	**6,111**	**1,314,901**	**11,003,954**
34. Fabricated Metal Products	**20,555**	**1,110,781**	**8,143,660**
35. Machinery (except Electrical) .	**24,548**	**1,751,921**	**13,380,729**
36. Electrical Machinery	**5,608**	**1,113,660**	**7,876,186**
37. Transportation Equipment	**5,194**	**1,952,771**	**14,534,323**
38. Instruments	**3,683**	**296,934**	**2,169,354**
Total Metalworking Industry.	**65,699**	**7,540,968**	**57,108,206**
39. Miscellaneous Manufactures ...	17,607	491,013	5,271,811

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*Based on 1953 County Business Patterns. †Based on 1953 Annual Survey of Manufactures.

World Production

METALWORKING FACTS AND FIGURES

By Countries—Net Tons

STEEL INGOT AND CASTINGS OUTPUT

	1955a	1954	1953	1952	1951	1950	1949	1948
World Total	294,925,000 ↓	245,408,595 ↓	258,152,925 ↓	223,028,460 ↓	232,179,538 ↓	208,102,045 ↓	177,636,876 ↓	168,798,590 ↓
United States	117,000,000	88,311,650	111,609,720	93,168,040	105,199,848	96,836,075	77,978,176	88,640,470
Canada	4,400,000	3,188,640	4,116,110	3,703,050	3,568,770	3,383,520	3,190,430	3,198,720
Great Britain	22,000,000	20,742,065	19,721,520	18,388,050	17,515,120	18,247,825	17,419,250	16,661,800
Japan	10,200,000	8,529,920	8,428,420	7,687,240	7,151,980	5,322,900	3,549,700	1,900,000
India	1,950,000	1,886,080	1,687,280	1,767,580	1,679,660	1,610,335	1,515,360	1,344,000
Australia	2,400,000	2,488,640	2,294,880	1,817,760	1,649,870	1,395,185	1,341,650	1,424,640
South Africa	1,700,000	1,517,600	1,367,855	1,325,630	1,045,070	832,385	804,100	766,080
Brazil	1,250,000	1,272,700	1,117,930	982,630	927,300	867,460	676,610	531,300
Mexico	500,000	450,240	508,310	559,350	498,410	240,460	379,610	294,800
Spain	1,300,000	1,206,700	983,730	998,030	900,020	899,800	791,560	631,680
Sweden	2,215,000	2,047,100	1,960,200	1,857,900	1,677,500	1,604,900	1,530,100	1,382,700
Austria	1,985,000	1,818,300	1,411,520	1,162,700	1,130,580	1,037,300	918,060	712,800
Yugoslavia	880,000	677,600	566,500	486,200	473,000	470,800	438,900	400,000
France	13,700,000	11,689,700	10,996,700	11,953,700	10,818,500	9,517,200	10,672,200	7,959,600
Saar	3,500,000	3,085,500	2,952,400	3,105,300	2,863,300	2,087,800	1,932,700	1,350,800
Belgium	6,400,000	5,509,900	4,986,300	5,592,400	5,577,000	4,167,900	4,252,600	4,308,700
Luxemburg	3,500,000	3,110,800	2,924,900	3,302,200	3,384,700	2,696,100	2,499,200	2,698,300
Italy (b)	5,900,000	4,627,700	3,850,000	3,888,500	3,307,590	2,555,300	2,260,500	2,337,500
The Netherlands	1,100,000	1,020,360	945,450	753,500	608,300	539,000	470,470	380,800
Germany	....	....	....	....	....	14,427,600	11,611,600	6,482,300
Germany, West. Zone	23,500,000	19,177,400	16,962,000	17,386,600	14,856,600	....	....	....
Free World Total	225,380,000	182,358,595	199,391,725	179,886,360	184,833,118	168,739,845	144,232,776	143,406,990
Germany, Soviet Zone	2,720,000	2,578,400	2,394,700	2,082,300	1,707,200	....	....	....
Czechoslovakia	5,445,000	4,875,000	4,873,000	4,169,000	3,643,200	3,312,100	3,038,200	2,915,000
Poland	4,840,000	4,360,400	3,964,400	3,501,300	3,071,200	2,766,500	2,533,300	2,150,000
Hungary	1,740,000	1,640,100	1,697,300	1,535,600	1,357,400	1,124,200	933,900	820,000
Rumania	860,000	691,900	790,900	767,800	710,600	613,800	504,900	373,000
U.S.S.R.	49,500,000	45,100,000	41,800,000	37,950,000	34,540,000	30,030,000	25,600,000	18,150,000
China	2,890,000	2,442,200	1,945,900	1,644,500	990,000	798,600	173,800	33,600
Iron Curtain Total	67,995,000	61,688,000	57,466,200	51,650,500	46,019,600	38,645,200	32,784,100	24,441,600
Other Countries (c)	1,550,000	1,362,000	1,295,000	1,491,600	1,326,820	717,000	620,000	950,000

(a) Estimated.
(b) Including Trieste except for 1951.
(c) Countries producing less than 500,000 tons annually.
(d) Rumania included in "Other Countries" prior to 1953.

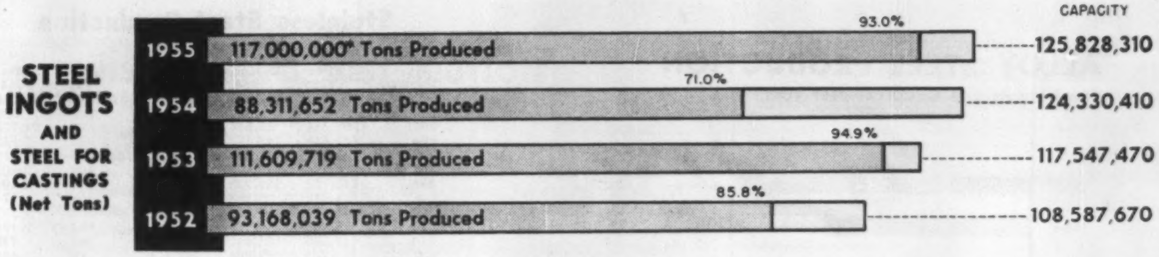
PIG IRON AND FERROALLOYS OUTPUT

(Includes ferroalloys made in electric furnaces, where available)

	1955a	1954	1953	1952	1951	1950	1949	1948
World Total	209,210,000 ↓	174,229,940 ↓	183,579,460 ↓	168,030,620 ↓	165,618,353 ↓	147,204,201 ↓	127,684,375 ↓	124,407,349 ↓
United States	78,000,000	59,806,240	75,842,760	63,353,955	72,488,543	66,400,311	54,916,785	61,911,559
Canada	3,500,000	2,213,120	3,165,905	2,913,680	2,812,540	2,497,600	2,356,480	2,365,440
Great Britain	13,825,000	13,309,410	12,515,775	12,015,025	10,829,050	10,788,850	10,638,320	10,389,570
Japan	5,800,000	5,068,800	4,969,910	3,821,620	3,550,000	2,528,680	1,740,480	914,100
India	2,150,000	2,196,300	1,989,455	2,075,360	2,016,110	1,880,370	1,804,320	1,639,700
Australia	2,000,000	2,058,560	1,894,705	1,718,080	1,470,900	1,229,870	1,170,400	1,383,900
South Africa	1,400,000	1,299,200	1,347,360	1,244,320	866,880	807,850	780,980	705,100
Brazil	1,150,000	1,168,200	974,600	892,650	848,760	801,900	562,870	607,200
Spain	1,100,000	998,360	910,470	870,540	719,400	733,700	676,000	581,500
Sweden	1,250,000	1,099,560	1,163,140	1,213,300	936,100	931,150	945,670	858,480
Austria	1,620,000	1,489,290	1,456,180	1,291,840	1,153,900	971,410	921,470	688,200
France	11,900,000	9,823,000	9,634,900	10,745,900	9,625,000	8,537,100	9,179,500	7,214,900
Saar	3,150,000	2,746,700	2,620,200	2,805,000	2,605,900	1,850,200	1,740,200	1,247,400
Belgium	5,800,000	5,107,100	4,639,800	5,269,000	5,335,000	4,064,500	4,123,900	4,337,300
Luxemburg	3,350,000	3,081,100	2,990,900	3,383,600	3,472,700	2,748,900	2,609,200	2,886,400
Italy (b)	1,900,000	1,521,300	1,475,100	1,325,500	1,110,450	482,790	448,800	578,600
The Netherlands	730,000	671,000	650,100	592,570	576,400	499,620	477,400	486,200
Germany	....	....	....	....	....	10,791,000	8,404,000	5,350,000
Germany, West. Zone	18,100,000	13,839,100	12,883,200	14,253,800	11,766,700	....	....	....
Free World Total	156,725,000	127,496,340	141,124,460	129,785,740	132,184,333	118,545,801	103,496,775	104,145,549
Germany, Soviet Zone	1,630,000	1,433,300	1,174,800	716,100	375,100	....	....	....
Czechoslovakia	3,410,000	3,080,000	3,069,000	2,563,000	2,370,500	2,257,200	2,071,000	1,850,000
Poland	3,245,000	2,857,800	2,528,900	1,960,200	1,734,700	1,636,800	1,367,000	1,210,000
Hungary	965,000	927,300	787,600	632,500	556,600	550,000	473,000	445,000
Rumania (d)	670,000	475,200	501,600	....	....	....	....	....
U.S.S.R.	36,850,000	33,000,000	30,250,000	27,720,000	24,310,000	21,340,000	18,500,000	15,400,000
China	3,815,000	3,355,000	2,443,100	2,583,900	2,200,000	1,374,400	246,600	156,800
Iron Curtain Total	50,585,000	45,128,600	40,755,000	36,175,700	31,546,900	27,158,400	22,657,600	19,061,800
Other Countries (c)	1,900,000	1,605,000	1,700,000	2,069,180	1,887,120	1,500,000	1,530,000	1,200,000

Production-Capacity

METALWORKING FACTS AND FIGURES



ANNUAL STEEL CAPACITY AND PRODUCTION BY PROCESSES

	Open-hearth		Bessemer		Crucible		Electric		TOTAL		Per Cent
	Capacity	Production	Capacity	Production	Capacity	Production	Capacity	Production	Capacity†	Production	Capacity
1955.....	110,234,160	....	4,787,000	....	40	....	10,807,110	....	125,828,310	117,000,000*	93.0*
1954.....	109,094,730	80,327,494	4,787,000	2,548,104	40	‡	10,448,640	5,436,054	124,330,410	88,311,652	71.0
1953.....	102,677,980	100,473,823	4,637,000	3,855,705	40	‡	10,232,450	7,280,191	117,547,470	111,609,719	94.9
1952.....	94,973,780	82,846,439	5,381,000	3,523,677	40	‡	8,232,850	6,797,923	108,587,670	93,168,039	85.8
1951.....	91,054,020	93,166,518	5,621,000	4,890,946	20	‡	7,554,610	7,142,384	104,229,650	105,199,848	100.9
1950.....	86,984,490	86,262,509	5,537,000	4,534,558	20	‡	6,871,290	6,039,008	99,392,800	96,836,075	96.9 #
1949.....	84,817,040	70,248,803	5,191,000	3,946,656	20	‡	6,112,870	3,782,717	96,120,930	77,978,176	81.1
1948.....	83,610,690	79,340,157	5,226,000	4,243,172	20	‡	5,396,750	5,057,141	94,233,460	88,640,470	94.1
1947.....	81,010,990	76,873,793	5,154,000	4,232,543	20	‡	5,076,240	3,787,735	91,241,250	84,894,071	93.0
1946.....	81,236,250	60,711,963	5,154,000	3,327,737	20	‡	5,500,290	2,563,024	91,890,560	66,602,724	72.5
1945.....	84,171,590	71,939,602	5,874,000	4,305,318	3,800	24	5,455,890	3,456,704	95,505,280	79,701,648	83.5
1944.....	82,223,610	80,363,953	6,074,000	5,039,923	3,800	25	5,350,880	4,237,699	93,652,290	89,641,600	95.5 #
1943.....	79,180,880	78,621,804	6,553,000	5,625,492	3,800	146	4,554,980	4,589,070	90,292,660	88,836,512	98.1 #
1942.....	78,107,260	76,501,957	6,721,400	5,553,424	3,800	2,010	3,737,510	3,974,540	88,569,970	86,031,931	96.8 #
1941.....	74,565,510	74,389,619	6,996,520	5,578,071	3,942	2,313	2,586,320	2,869,256	84,152,292	82,839,259	97.3 #
1940.....	73,721,592	61,573,083	6,009,920	3,708,573	5,354	1,024	1,882,630	1,700,006	81,619,496	66,982,686	82.1
1939.....	72,959,638	48,409,800	7,138,880	3,358,916	5,354	931	1,725,086	1,029,067	81,828,958	52,798,714	64.5
1938.....	71,472,370	29,080,016	7,212,800	2,106,340	9,610	7	1,490,858	565,627	80,185,638	31,751,990	39.6
1937.....	69,725,736	51,824,979	7,084,000	3,863,918	11,850	1,046	1,326,788	947,002	78,148,374	56,636,945	72.5
1936.....	68,946,829	48,760,463	8,058,400	3,873,472	11,850	914	1,147,221	865,150	78,164,300	53,499,999	68.4
1935.....	68,544,310	34,401,280	8,842,400	3,175,235	11,850	719	1,053,370	606,471	78,451,930	38,183,705	48.7

*Estimated by STEEL. †As of Jan. 1. ‡Included with electric steel. # Based on average annual capacity. American Iron & Steel Institute.

MONTHLY OUTPUT OF STEEL FOR INGOTS AND CASTINGS

	Open-hearth		Bessemer		Electric		Total		Calculated	No.
	Net Tons	% Capac.	Net Tons	% Capac.	Net Tons	% Capac.	Net Tons	% Capac.	Net Tons Weekly	weeks in mo.
1955 ..	....	...	......	...	......	...	....	...	....	...
Jan. ..	8,054,345	86.0	199,229	49.0	584,162	63.6	8,837,736	82.7	1,994,974	4.43
Feb. ..	7,734,884	91.5	197,091	53.7	564,959	68.1	8,496,934	88.0	2,124,233	4.00
Mar. ..	9,060,026	96.7	255,493	62.8	666,235	72.6	9,981,754	93.4	2,253,218	4.43
Apr. ..	8,858,549	97.7	275,069	69.8	681,477	76.6	9,815,095	94.8	2,287,901	4.29
May ..	9,307,291	99.4	305,347	75.1	715,678	77.9	10,328,316	96.6	2,331,448	4.43
June ..	8,764,430	96.6	283,544	72.0	698,493	78.6	9,746,467	94.1	2,271,904	4.29
July ..	8,232,535	88.1	268,348	66.1	600,063	65.5	9,100,946	85.3	2,059,038	4.42
Aug. ..	8,600,612	91.8	298,972	73.5	694,961	75.7	9,594,545	89.7	2,165,812	4.43
Sept. .	8,829,266	97.6	307,171	78.2	745,888	84.1	9,882,325	95.7	2,308,954	4.28
Oct. ..	9,374,000	100.1	330,000	81.1	798,000	86.9	10,502,000	98.2	2,371,000	4.43
Nov. ..	....	...	......	...	......	...	....	...	....	4.29
Dec. ..	....	...	......	...	......	...	....	...	....	4.42
1954 ..	80,327,494	73.6	2,548,104	53.2	5,436,054	52.0	88,311,652	71.0	1,693,741	52.14
Jan. ..	7,256,526	78.3	260,453	64.0	434,507	48.9	7,951,486	75.3	1,794,918	4.43
Feb. ..	6,523,213	77.9	174,253	47.4	385,771	48.1	7,083,237	74.3	1,770,809	4.00
Mar. ..	6,649,667	71.7	207,726	51.1	432,207	48.7	7,289,600	69.0	1,645,508	4.43
Apr. ..	6,365,326	70.9	162,657	41.3	442,954	51.5	6,970,937	68.1	1,624,927	4.29
May ..	6,817,951	73.6	198,063	48.7	456,724	51.4	7,472,738	70.7	1,686,848	4.43
June ..	6,702,006	74.7	207,666	52.7	453,962	52.8	7,363,634	72.0	1,716,465	4.29
July ..	6,040,120	65.3	205,313	50.6	382,164	43.1	6,627,597	62.9	1,499,456	4.42
Aug. ..	6,021,496	65.0	217,837	53.6	427,574	48.2	6,666,907	63.1	1,504,945	4.43
Sept. .	6,140,266	68.6	214,065	54.5	453,152	52.8	6,807,483	66.7	1,590,533	4.28
Oct. ..	6,973,568	75.2	237,754	58.5	490,211	55.2	7,701,533	72.9	1,738,495	4.43
Nov. ..	7,307,151	81.4	231,191	58.7	551,085	64.1	8,089,427	79.1	1,885,647	4.29
Dec. ..	7,530,204	81.4	231,126	57.0	525,743	59.4	8,287,073	78.6	1,874,903	4.42

American Iron & Steel Institute.

PIG IRON†

CAPACITY and PRODUCTION

Net Tons

	Capacity	Production	%
1955	83,971,100	78,000,000*	92.9*
January		5,784,653	81.1
February		5,442,767	84.5
March		6,463,951	90.6
April		6,384,639	92.4
May		6,804,935	95.4
June		6,543,878	94.7
July		6,390,559	89.8
August		6,601,482	92.5
September		6,703,366	97.3
October		6,965,273	97.6
November		....	...
December		....	...
1954	82,001,390	58,686,884	71.6
1953	79,380,240	75,856,872	95.6
1952	73,782,340	62,150,926	84.2
1951	72,471,780	71,227,750	98.3
1950	71,560,110	65,439,769	91.4
1949	70,541,850	54,175,534	76.8
1948	67,438,930	61,043,806	90.5
1947	65,709,200	59,314,348	90.3
1946	67,340,590	45,547,907	67.6
1945	67,313,890	54,166,482	80.5
1944	67,921,410	62,072,683	91.4
1943	64,188,220	61,920,314	96.5
1942	60,606,850	60,115,387	99.2
1941	57,774,640	56,070,506	97.1
1940	55,723,640	46,979,091	84.3

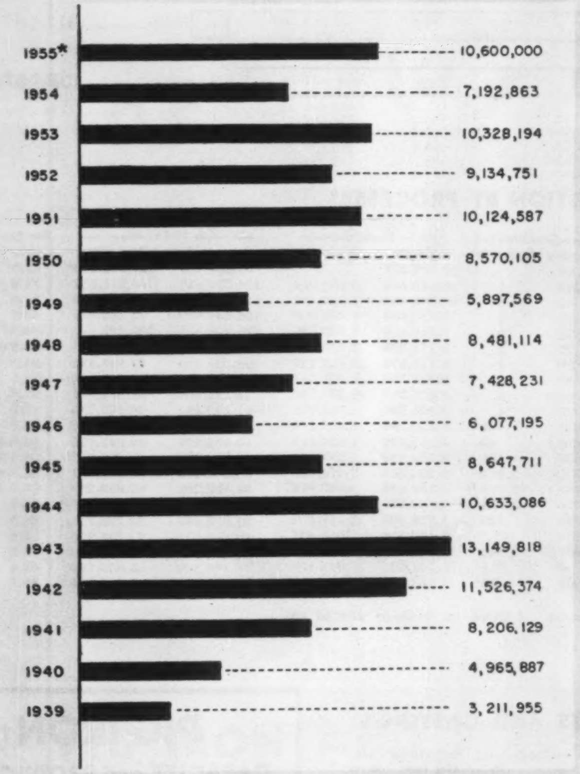
†Including ferroalloys made in blast furnaces. *Estimated by STEEL.
American Iron & Steel Institute.

Ferrous Production

METALWORKING FACTS AND FIGURES

ALLOY STEEL PRODUCTION

Total Ingots and Castings—Net Tons



ALLOY STEEL PRODUCTION BY PROCESSES

Ingots and Castings—Net Tons

	Open-Hearth					
	Basic	Acid	Total	Bessemer	Crucible	Electric
1955‡...	....	....	5,644,791	....	†	3,066,664
1954...	4,528,336	130,559	4,658,895	....	†	1,533,968
1953...	6,599,038	185,341	6,784,379	....	†	3,543,815
1952...	5,807,191	218,867	6,026,058	....	†	3,108,693
1951...	6,585,635	238,034	6,823,669	....	†	3,300,918
1950...	5,738,067	123,253	5,861,320	....	†	2,708,785
1949...	4,192,344	105,550	4,297,894	....	†	1,599,675
1948...	6,285,054	128,915	6,413,969	....	†	2,067,145
1947...	5,520,540	128,754	5,649,294	....	†	1,778,937
1946...	4,325,657	115,711	4,441,368	....	†	1,635,827
1945...	5,572,353	274,889	5,847,242	....	18	2,800,451
1944...	6,494,627	515,662	7,010,289	....	23	3,622,774
1943...	8,539,523	677,416	9,216,939	....	136	3,932,743
1942...	7,524,209	608,867	8,133,076	....	522	3,392,776
1941...	5,306,415	433,240	5,739,655	3,890	933	2,461,651
1940...	3,421,961	252,965	3,674,926	3,990	255	1,286,716
1939...	2,302,273	156,581	2,458,854	3,486	231	749,384

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*Estimated.
‡First ten months.
†Included with electric steel.
American Iron & Steel Institute.

Stainless Steel Production

Net Tons of Ingots

Type Number	9 Mos. 1955	12 Mos. 1954	Type Number	9 Mos. 1955	12 Mos. 1954
201	523	.....	410	38,135	37,546
202	267	.....	414	329	586
301	58,664	52,916	416	24,392	21,774
302	160,414	148,478	420	4,988	3,912
302B	1,222	848	430	269,975	232,515
303	25,194	20,833	430F	2,905	2,209
304	113,753	125,295	431	2,905	2,404
308	4,216	3,298	440A	1,958	1,274
309	5,694	4,226	440B	981	1,211
310	8,884	12,429	440C	1,683	2,151
316	41,235	39,042	442	866	735
321	25,791	27,994	443	45	480
347	6,634	10,466	446	2,196	1,799
403	17,941	22,063	All other.	52,166	67,238
405	3,269	3,426			
406	1,958	1,026	Total ...	879,183	848,174

American Iron & Steel Institute.

High Speed and Tool Steel Bars

(Excluding Hollow Drill Steel)

Shipments—Net Tons

CLASS A HIGH SPEED STEEL

Grade	C (Min.)	Cr —(Maximum)—	W	Mo	V	Co (Min.)	9 Mos. 1955	12 Mos. 1954
I	0.60	4.5	6.75	5.5	2.1 Max.	..	7,541	6,446
I-b	0.90	4.5	6.75	6.5	2.25 Min.	..	610	489
I-c	0.60	4.5	6.75	5.5	2.2 Max.	3.5	92	59
II	0.60	4.5	2.0	9.25	1.3 Max.	..	4,282	3,222
II-c	0.60	4.5	2.0	9.25	2.2 Max.	3.5	90	139
III	0.60	4.5	...	9.25	2.2 Max.	..	2,785	2,443
III-c	0.60	4.5	...	9.25	2.2 Max.	3.5	6	17
Total							15,406	12,815

CLASS B HIGH SPEED STEEL

Grade	C (Min.)	Cr	W	Mo	V	Co (Min.)	9 Mos. 1955	12 Mos. 1954
IV	0.55	4.5	19.0	...	1.3 Max.	..	1,722	1,838
IV-b	0.55	4.5	19.0	1.25	1.75 Min.	..	215	204
IV-c	0.55	4.5	22.0	1.25	2.2 Max.	3.5	498	498
Total							2,435	2,540

OTHER TOOL STEELS

		9 Mos. 1955	12 Mos. 1954
V	All hot-work steel	8,691	8,857
VI	High chromium (4% Cr minimum) die steels	7,594	7,832
VII	All other alloy tool steels	38,800	40,342
VIII	Carbon tool steels, excluding hollow drill steel	11,181	12,626
Total		66,266	69,657
Grand Total		84,107	85,012

American Iron & Steel Institute.

Steel Forgings

Shipments for Sale—Net Tons

1955	Drop and Upset	Press and Open Hammer	Total
Jan.	102,976	32,960	135,936
Feb.	102,078	33,331	135,409
Mar.	119,186	35,244	154,430
Apr.	113,461	36,180	149,641
May	109,368	37,670	147,038
June	117,019	38,433	155,452
July	82,659	32,345	115,004
Aug.	99,904	34,898	134,802
Sept.	110,141	38,611	148,752
Oct.	......	......	......
Nov.	......	......	......
Dec.	......	......	......
1954	1,049,803	351,404	1,401,207
Jan.	101,523	37,403	138,926
Feb.	94,164	32,724	126,888
Mar.	95,529	34,695	130,224
Apr.	86,446	29,349	115,795
May	80,939	26,182	107,121
June	86,185	26,904	113,089
July	74,449	22,306	96,755
Aug.	77,165	25,026	102,191
Sept.	81,714	27,379	109,093
Oct.	85,978	26,983	112,961
Nov.	89,270	30,429	119,699
Dec.	96,441	32,024	128,465
1953	1,477,290	563,656	2,040,946
1952	1,366,123	519,539	1,885,662
1951	1,323,713	503,093	1,826,806
1950	1,089,515	270,638	1,360,153

U. S. Bureau of the Census.

Distribution

METALWORKING FACTS AND FIGURES

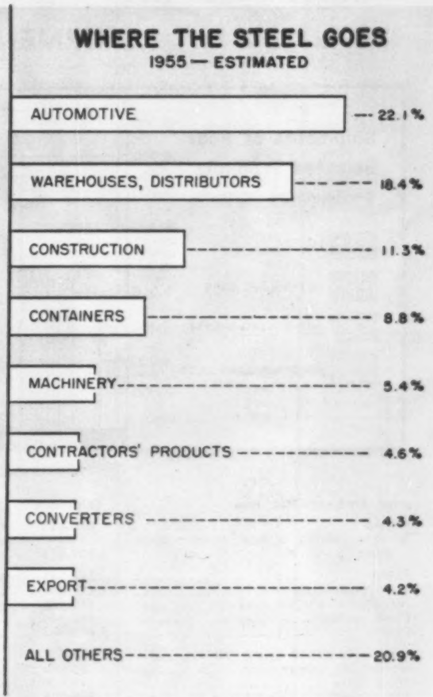
FINISHED STEEL DISTRIBUTION

By Market Classifications

(All Grades, Net Tons)

	12 mos. 1955*	12 mos. 1954	12 mos. 1953	12 mos. 1952
Automotive	18,875,610	11,792,989	14,663,775	10,850,797
Warehouses and Distributors	15,715,440	11,999,470	14,878,859	13,328,642
Construction, including Maintenance	9,651,330	8,634,987	9,918,203	7,800,619
Containers	7,516,080	5,870,618	6,051,214	5,550,625
Machinery, Indus. Equip. & Tools	4,612,140	3,517,038	4,328,604	3,795,596
Contractors' Products	3,928,860	2,969,812	3,324,218	2,612,071
Converters and Processors	3,672,630	2,452,703	3,513,976	3,037,146
Export	3,587,220	2,533,883	2,679,731	3,271,200
Rail Transportation	3,501,810	2,457,297	4,787,830	3,986,029
Electrical Machinery and Equip.	2,306,070	1,739,007	2,111,879	1,609,461
Appliances	2,220,660	1,441,461	2,045,749	1,359,227
Other Domestic & Commercial Equip.	2,135,250	1,742,090	2,086,076	1,562,458
Bolts, Nuts, Rivets, Screws	1,451,970	964,483	1,341,606	1,297,486
Agricultural	1,366,560	1,189,199	1,233,247	1,347,042
Forgings (other than Automotive)	1,281,150	830,965	1,444,839	1,434,157
Ordnance, Other Military	939,510	964,440	2,690,888	2,095,593
Unclassified	939,510	675,019	937,853	822,736
Oil and Gas Drilling	768,690	585,562	755,714	768,208
Shipbuilding, Marine Equipment	597,870	501,231	872,209	1,028,554
Mining, Quarrying, Lumbering	256,230	201,624	324,380	309,628
Aircraft	85,410	88,848	161,043	136,337
Total	85,410,000	63,152,726	80,151,893	68,003,612

*Estimated by STEEL on basis of actual shipments in first 9 months.
American Iron & Steel Institute.



WHERE THE STEEL GOES
1955 — ESTIMATED

DISTRIBUTION

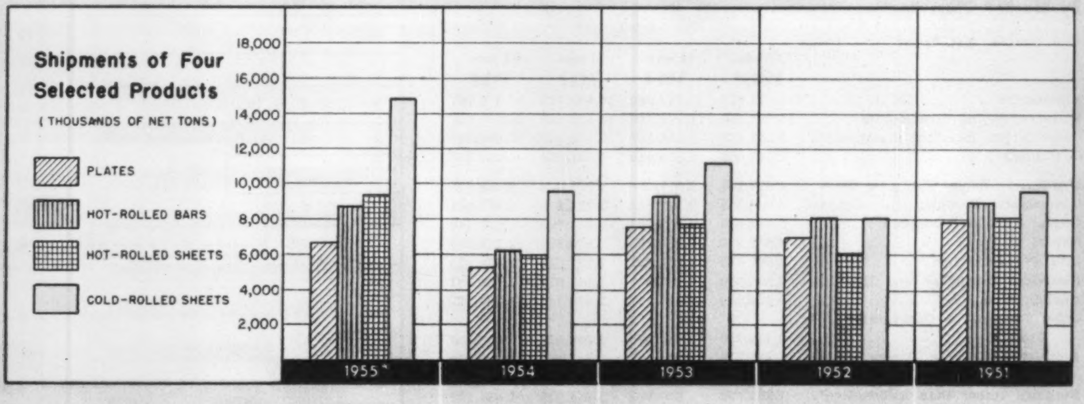
NET TONS

By Market Classifications	STAINLESS STEEL 9 mos. 1955	STAINLESS STEEL 12 mos. 1954	STAINLESS STEEL 12 mos. 1953	ALLOY STEEL (Other than Stainless) 9 mos. 1955	ALLOY STEEL 12 mos. 1954	ALLOY STEEL 12 mos. 1953	CARBON STEEL 9 mos. 1955	CARBON STEEL 12 mos. 1954	CARBON STEEL 12 mos. 1953
Converters and Processors	46,299	30,002	31,735	63,909	58,537	95.827	2,558,525	2,364,164	3,386,414
Forgings (Other than Automotive)	10,089	8,678	13,904	367,630	340,005	591.516	539,484	482,282	839,419
Bolts, Nuts, Rivets, Screws	6,485	6,480	6,876	58,731	48,472	81.864	1,007,810	909,531	1,252,866
Warehouses and Distributors	135,136	123,276	155,436	414,956	419,793	469,787	11,007,392	11,456,401	14,253,636
Construction, including Maintenance	3,151	5,059	6,365	54,007	67,260	101,908	7,047,514	8,562,668	9,809,930
Contractors' Products	12,692	9,337	12,392	16.056	13,060	34.826	2,878,592	2,947,415	3,277,000
Automotive	104,332	86,303	127,993	1.548,467	1,297,244	1,997,907	12,207,400	10,409,442	12,537,875
Rail Transportation	4,087	4,688	6,340	97,978	70,566	182,680	2,444,728	2,382,043	4,598,810
Shipbuilding, Marine Equip.	1,536	1,537	3,160	30,168	58,104	61,584	409,697	441,590	807,465
Aircraft	15,910	18,600	32,092	34,007	38,638	78,404	20,963	31,610	50,547
Oil and Gas Drilling	219	592	1,982	146,879	134,946	165,715	439,743	450,024	588,017
Mining, Quarrying, Lumbering	293	249	526	20,398	13,540	23,977	172,184	187,835	299,877
Agricultural	287	389	457	28,817	27,053	40,071	947,051	1,161,757	1,192,719
Machinery, Indus. Equip. & Tools	29,864	29,051	39,422	425.657	385,274	573,289	2,951.583	3,102,713	3,715,893
Electrical Machinery and Equip.	6,252	7.131	14.571	419,522	407,228	594,136	1,247,702	1,324,648	1,503,172
Appliances, Utensils, Cutlery	35,819	31,914	40,656	16,090	19,342	36,406	1.572,680	1,390,205	1,968,687
Other Domestic & Commercial Equip.	11,542	11,488	13,875	14,989	16.537	32,664	1,567,036	1,714,065	2,039,537
Containers	3.089	1,610	1,538	18,874	17,444	24,162	5,469,684	5,851,564	6,025,514
Ordnance, Other Military	2,191	3,559	10,191	68,940	113,631	318,839	628,146	847,250	2,361,858
Export	17,789	16,603	13,134	80,651	105,778	126,368	2,511,467	2,411,502	2,540,229
Unclassified	53,696	55,805	69,063	121,115	113,300	185,866	494,623	505,914	682,924
Total	500,758	452,351	601,708	4,047,841	3,765,752	5,817,796	58,124,004	58,934,623	73,732,389

American Iron & Steel Institute.

Steel Shipments

SHIPMENTS OF STEEL PRODUCTS



Steel Products—Net tons	Shipments	%	Shipments	%	Shipments	%	Shipments	%	Shipments	%
Ingots	606,411	0.71	316,664	0.5	918,589	1.1	1,128,070	1.7	1,315,846	1.7
Blooms, slabs, billets, tube rounds, sheet bars, etc.	2,827,071	3.31	1,530,025	2.4	2,625,152	3.3	2,301,042	3.4	2,239,747	2.8
Skelp	179,361	0.21	129,679	0.2	113,397	0.1	107,134	0.2	152,474	0.2
Wire rods	1,178,658	1.38	760,885	1.2	800,648	1.0	741,541	1.1	847,369	1.1
Structural shapes (heavy)	4,680,468	5.48	4,501,183	7.1	5,022,012	6.3	4,138,251	6.1	4,921,970	6.2
Steel piling	384,345	0.45	387,654	0.6	342,894	0.4	234,461	0.3	399,073	0.5
Plates	6,593,652	7.72	5,340,262	8.5	7,668,274	9.6	7,006,123	10.3	7,910,594	10.0
Rails—Standard (over 60 lb)	1,255,527	1.47	1,113,366	1.8	1,866,546	2.3	1,348,324	2.0	1,699,042	2.2
Rails—All other	76,869	0.09	83,577	0.1	87,510	0.1	105,704	0.1	120,715	0.2
Joint bars	76,869	0.09	64,304	0.1	121,102	0.2	109,288	0.1	132,173	0.2
Tie plates	324,558	0.38	236,011	0.4	425,945	0.5	377,817	0.6	445,932	0.6
Track spikes	102,492	0.12	65,608	0.1	120,409	0.2	97,634	0.1	158,406	0.2
Wheels (rolled or forged)	298,935	0.35	192,483	0.3	332,245	0.4	329,825	0.5	396,561	0.5
Axles	111,033	0.13	60,956	0.1	154,210	0.2	164,230	0.2	221,097	0.3
Bars—Hot-rolled (including light shapes)	8,711,820	10.20	6,255,465	9.9	9,323,429	11.6	8,111,683	11.9	8,930,633	11.3
Bars—Reinforcing	2,143,791	2.51	1,750,957	2.8	1,848,851	2.3	1,813,146	2.7	1,900,125	2.4
Bars—Cold-finished	1,861,938	2.18	1,210,273	1.9	2,194,375	2.7	1,922,205	2.8	1,935.823	2.5
Tool steel	111,033	0.13	84,143	0.1	116,152	0.1	120,687	0.2	171,056	0.2
Standard pipe	2,989,350	3.50	2,320,265	3.7	2,801,820	3.5	2,425,351	3.6	2,933.321	3.7
Oil country goods	2,528,136	2.96	2,291,176	3.6	2,019,345	2.5	1,610,132	2.4	1,879,216	2.4
Line pipe	3,108,924	3.64	2,594,873	4.1	3,507,318	4.4	2,882,061	4.2	3,186,838	4.0
Mechanical tubing	948,051	1.11	674,214	1.1	1,089,480	1.4	945,314	1.4	980.066	1.2
Pressure tubing	273,312	0.32	277,208	0.4	440,675	0.6	417,550	0.6	332,430	0.4
Wire—Drawn	3,202,875	3.75	2,420,982	3.8	2,826,744	3.5	2,638,562	3.9	3,219,829	4.1
Wire—Nails and staples	708,903	0.83	567,382	0.9	528,935	0.7	651,447	1.0	864,833	1.1
Wire—Barbed and twisted	136,656	0.16	132,346	0.2	163,801	0.2	240,733	0.3	237,805	0.3
Wire—Woven wire fence	367,263	0.43	299,917	0.5	245,264	0.3	331,405	0.5	416,704	0.5
Wire—Bale ties	76,869	0.09	51,749	0.1	37,945	..	57,766	0.1	110,407	0.1
Black plate	837,018	0.98	672,803	1.1	748,889	0.9	879,931	1.3	1,076,296	1.4
Tin and terne plate—Hot dipped	1,246,986	1.46	1,307,096	2.1	1,318,080	1.6	1,365,590	2.0	1,628,562	2.1
Tin plate—Electrolytic	5,107,518	5.98	3,680,467	5.8	3,343,458	4.2	2,817,449	4.1	2,887,129	3.7
Sheets—Hot-rolled	9,437,805	11.05	6,094,268	9.7	7,742,609	9.7	6,098,899	9.0	8,170,733	10.3
Sheets—Cold-rolled	14,963,832	17.52	9,605,689	15.2	11,274,369	14.1	8,009,255	11.8	9,640,960	12.2
Sheets—Galvanized	2,844,153	3.33	2,362,632	3.7	2,290,868	2.9	1,961,158	2.9	1,984,961	2.5
Sheets—All other coated	273,312	0.32	178,961	0.3	253,946	0.3	206,332	0.3	257,195	0.3
Sheets—Enameling	222,066	0.26	180,218	0.3	228,938	0.3	149,108	0.2	182,187	0.2
Electrical sheets and strip	794,313	0.93	588,851	0.9	820,096	1.0	607,076	0.9	757,861	1.0
Strip—Hot-rolled	2,109,627	2.47	1,486,141	2.4	2,221,462	2.8	1,837,086	2.7	2,206,978	2.8
Strip—Cold-rolled	1,708,200	2.00	1,281,993	2.0	2,166,111	2.7	1,714,242	2.5	2,076,003	2.6
Total steel products	85,410,000	100.00	63,152,726	100.0	80,151,893	100.0	68,003,612	100.0	78,928,950	100.0

1955 SHIPMENTS OF FINISHED STEEL BY TYPES

(Net tons)

	Carbon	Alloy	Stainless	Total
Jan.	5,559,074	402,745	48,139	6,009,958
Feb.	5,677,138	393,932	48,830	6,119,900
Mar.	6,750,842	459,531	58,422	7,268,795
Apr.	6,767,315	454,219	57,787	7,279,321
May	7,000,034	482,426	58,429	7,540,889
June	7,217,242	487,627	65,344	7,770,213
July	5,802,453	399,744	48,400	6,250,597
Aug.	6,527,112	470,344	56,159	7,053,615
Sept.	6,821,600	497,375	59,272	7,378,247
9 Mos.	58,122,810	4,047,943	500,782	62,671,535

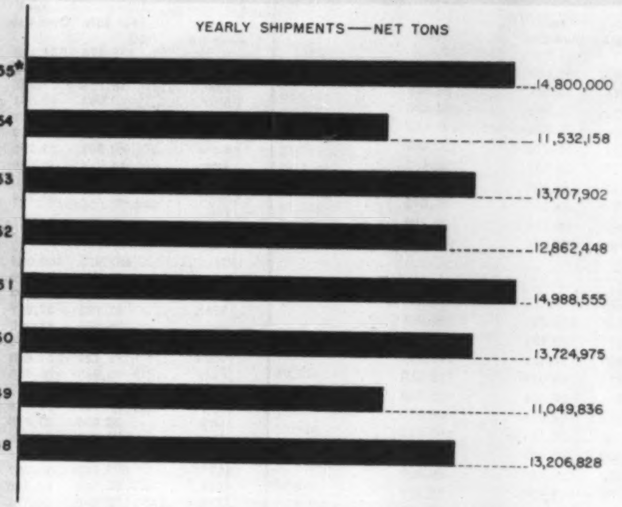
American Iron & Steel Institute.

*Estimated.

Castings

METALWORKING FACTS AND FIGURES

GRAY IRON CASTINGS



Shipments—Net Tons

	Miscel-laneous	Ingot Molds	Chilled Iron Railroad Car Wheels	Cast Iron Pressure Pipe & Fittings	Cast Iron Soil Pipe & Fittings	For Sale	For Own Use
1955							
9 Mos.	6,781,476	1,969,553	292.536	1,238,260	680.238	5,913,018	5,049,045
Jan.	712,097	192,132	25.783	100.638	61.273	563.153	528.770
Feb.	720,304	196,118	27.401	95.285	67.057	578,171	527,994
Mar.	847,874	217,571	36,732	129.746	82.995	688,733	626.185
Apr.	819,872	216,116	35,415	145,871	76,404	679.867	613.811
May	803,897	227,236	35.966	168.772	74,553	707,105	603.319
June	793,067	228,044	43,807	147.351	83.927	715.862	580.334
July	634,869	210,130	28,181	129.191	67.340	579,122	490.589
Aug.	718,423	238,007	29,298	156,074	84,510	688,317	537.995
Sept.	731,073	244,199	29,953	165,332	82,179	712,688	540,048
Oct.	......	......	......	......	......	......	......
Nov.	......	......	......	......	......	......	......
Dec.	......	......	......	......	......	......	......
1954	7,291,912	1,784,625	336,239	1,375.671	743,711	6,322,989	5,209,169
Jan.	607,755	154.359	31.316	90.898	47.970	488.497	443.801
Feb.	607,085	156,933	29.240	92.546	50.560	491,983	444.381
Mar.	684,272	153.366	34.240	113.016	61,885	553.358	493.421
Apr.	657,126	126.083	29.075	116.420	66.348	528,027	467.025
May	605,385	122,839	27,144	122,514	65.453	516.475	426.860
June	616,317	141.712	30.883	130.503	67.395	556.047	430.763
July	510,173	131,180	22,902	97.810	59.086	449.621	371.530
Aug.	569,790	140,165	29.134	127.255	68.300	541.904	392.740
Sept.	559.934	139,679	25.374	124.821	71,424	533,909	387.323
Oct.	569,985	150,282	23,979	130.326	68.362	552,022	390.912
Nov.	623,390	167,983	25,723	118.480	61.725	547.447	449.554
Dec.	680,700	200,044	27,229	111,082	55,203	563,699	510,559
1953	8,449,837	2,828,159	467,142	1,285.598	677.166	7,494.843	6,213.059
Jan.	735,055	253,477	38.329	94.547	47.290	628.622	540.076
Feb.	723.938	229,524	44.355	93.751	48.288	610.478	529.378
Mar.	806.494	251,755	41,354	115.614	57.371	681.479	591.109
Apr.	805,581	248,215	44.814	120.884	65,832	689.764	595.562
May	739,952	239,468	41,316	113.868	58.751	650.131	543.224
June	749.435	233.864	45.479	114.890	60.362	654.381	549.649
July	657,413	213,352	36,666	98.404	57.648	578.956	484.527
Aug.	658,637	219.105	34.625	108.532	56.662	598.682	478.879
Sept.	671,869	233,342	37.003	109.002	59.221	617.973	492.464
Oct.	672,571	247,324	41,858	119.124	65.851	656.612	490.116
Nov.	592,145	229,013	31.332	102.275	54.143	569.561	439.347
Dec.	636,747	229,720	30,011	94.707	45,747	558,204	478,728
1952	8,122,274	2,238,309	544.896	1.312.518	651.467	7.371.700	5.497.764
1951	9.573,347	2,614.517	639.996	1.473.192	687.503	8.453.048	6.535.507
1950	8,745.298	2,423.376	546.301	1.215.367	794.633	7.323.739	6.401.236
1949	7,004.674	1,844,485	581,690	1,037.189	581.798	5.787.146	5.262.690
1948	8,625,527	2,029,874	742,339	1,155,095	653,993	7,380,603	5,826,225

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*Estimated.

U. S. Bureau of the Census.

DIE CASTINGS

Shipments—Thousands of Pounds

Copper and Copper-Base

	1955	1954	1953
Jan.	591	816	851
Feb.	641	758	850
Mar.	742	875	902
Apr.	654	377	893
May	764	318	895
June	739	456	872
July	691	392	692
Aug.	844	459	854
Sept.	692	548	840
Oct.	....	521	853
Nov.	....	507	757
Dec.	....	482	818
Total	....	6,509	10,077

YEARLY TOTALS

1952	8,259	1949	9,499
1951	12,516	1948	13,642
1950	15,099	1947	13,138

Aluminum and Aluminum-Base

	1955	1954	1953
Jan.	26.819	20.826	19,985
Feb.	28,234	19.830	20.129
Mar.	33,229	23.851	21,935
Apr.	30,208	21.578	22,305
May	31,243	19.559	20,858
June	27,939	19.029	21,335
July	21,656	15,038	18,549
Aug.	27,004	15.835	17,837
Sept.	28,532	19,344	17,875
Oct.	.....	22,247	20,547
Nov.	.....	22,137	19,012
Dec.	.....	26,017	18,963
Total	.....	245,291	239,330

YEARLY TOTALS

1952	169,732	1949	98,340
1951	151,465	1948	128,903
1950	167,201	1947	115,644

Zinc and Zinc-Base

	1955	1954	1953
Jan.	57,915	42,886	45,662
Feb.	57,913	40,244	46,302
Mar.	71,073	49.501	50,977
Apr.	70,867	42,793	50,777
May	63,025	40.419	43,699
June	65.903	43.923	48,394
July	47,389	31,309	38,542
Aug.	61,957	37.599	37,374
Sept.	61,339	38,482	38,054
Oct.	.....	41,652	40,282
Nov.	.....	51,339	36,935
Dec.	.....	53,798	38,035
Total	.....	513,945	515,033

YEARLY TOTALS

1952	405,538	1949	397,001
1951	474,937	1948	457,008
1950	574,196	1947	438,693

Lead and Lead-Base

	1955	1954	1953
Jan.	1,734	1,514	1,939
Feb.	1,571	1,303	1,645
Mar.	1,537	1.335	1,912
Apr.	1,614	1.559	1,979
May	1,530	1,529	1,792
June	2,045	1,711	1,777
July	1,684	1,391	1,506
Aug.	1,904	1,726	1,806
Sept.	1,924	1,626	1,743
Oct.	....	1,784	1,709
Nov.	....	1,355	1,405
Dec.	....	1,563	1,231
Total	....	18,396	20,444

YEARLY TOTALS

1952	20,941	1949	13,743
1951	25,936	1948	22,887
1950	20,977	1947	18,165

U. S. Bureau of the Census.

Castings

STEEL CASTINGS

Shipments—Net Tons

	Carbon	Alloy, Including Stainless	For Sale	For Own Use	Total
1955					
9 Mos.	754,701	318,956	817,188	256,469	1,073,657
Jan.	67,397	30,841	75,044	23,194	98,238
Feb.	74,709	31,721	80,729	25,701	106,430
Mar.	88,867	38,593	98,926	28,534	127,460
Apr.	84,247	35,806	92,237	27,816	120,053
May	85,950	36,515	92,713	29,752	122,465
June	93,417	40,470	102,457	31,430	133,887
July	68,094	29,781	71,170	26,705	97,875
Aug.	91,245	35,161	96,290	30,116	126,406
Sept.	100,775	40,068	107,622	33,221	140,843
Oct.	......	......	......	......	......
Nov.	......	......	......	......	......
Dec.	......	......	......	......	......
1954	802,811	381,285	880,158	303,938	1,184,096
Jan.	83,927	38,831	93,577	29,181	122,758
Feb.	81,433	35,087	88,699	27,821	116,520
Mar.	85,211	37,099	92,271	30,039	122,310
Apr.	72,118	33,670	78,754	27,034	105,788
May	64,546	30,064	70,596	24,014	94,610
June	69,021	31,001	72,881	27,141	100,022
July	50,453	25,395	53,207	22,641	75,848
Aug.	61,334	28,256	66,792	22,798	89,590
Sept.	59,039	29,320	64,722	23,637	88,359
Oct.	56,705	30,380	64,004	23.081	87,085
Nov.	56,057	31,602	64,812	22,847	87,659
Dec.	62,967	30,580	69,843	23,704	93,547
1953	1,276,729	557,468	1,400,013	434,184	1,834,197
Jan.	116,993	50,700	126,846	40,847	167,693
Feb.	121,126	55,024	137,733	38,417	176,150
Mar.	127,510	55,292	141,945	40,857	182,802
Apr.	126,954	53,232	140,069	40,117	180,186
May	116,668	49,520	126,388	39,800	166,188
June	115.678	49,503	126,022	39,159	165,181
July	95,448	44,790	105,810	34,428	140,238
Aug.	96,631	45,385	108,055	33,961	142,016
Sept.	95,100	40,353	102,986	32,467	135,453
Oct.	99,700	41,066	106,813	33,953	140,766
Nov.	79,314	34,915	85,047	29,182	114,229
Dec.	85,607	37,688	92,299	30,996	123,295
1952	1,375,233	552,709	1,476,242	451,700	1,927,942
1951	1,541,480	508,574	1,506,903	543,151	2,050,054
1950	1,129,588	350,999	1,081,650	398,937	1,480,587
1949	962,601	297,369	n.a.	n.a.	1,259,970
1948	1,408,459	370,206	n.a.	n.a.	1,778.665

U. S. Bureau of the Census. n.a.=not available.

MALLEABLE IRON CASTINGS

Shipments—Net Tons

	For Sale	For Own Use	Total
1955			
9 Mos. ..	480,270	334,413	814,683
Jan.	48,000	34,028	82,028
Feb.	48,721	37,258	85,979
Mar.	60,063	42,301	102,364
Apr.	57,397	43,829	101,226
May	57,317	41,080	98.397
June	60,261	39,195	99,456
July	44,914	30,656	75,570
Aug.	48,126	34,322	82,448
Sept.	55,471	31,744	87,215
Oct.	......	......	......
Nov.	......	......	......
Dec.	......	......	......
1954	461,925	360,091	822,016
Jan.	38,209	32,079	70,288
Feb.	37,792	31,286	69,078
Mar.	47,125	37,217	84,342
Apr.	39,102	35.413	74,515
May	37,306	30.550	67,856
June	41,121	31,699	72,820
July	25,243	25,650	50,893
Aug.	34,528	24,731	59,259
Sept.	33.929	24,086	58,015
Oct.	36.956	27.365	64,321
Nov.	41,609	28.421	70,030
Dec.	49,005	31,594	80,599
1953	578,749	391.757	970,506
Jan.	53,358	34,196	87,554
Feb.	52,046	34,774	86,820
Mar.	57,117	37,697	94,814
Apr.	57,851	38,411	96,262
May	48,089	34.258	82,347
June	50,901	35,925	86,826
July	45.487	31,902	77,389
Aug.	45,489	28,623	74,112
Sept.	45,540	29,053	74,593
Oct.	45,589	28,138	73,727
Nov.	37,561	26.102	63,663
Dec.	39,721	32,678	72,399
1952	573,472	352,648	926,120
1950	536,945	405,279	942.224
1951	656,076	429,165	1,085,241
1949	373,313	349,585	722,898
1948	527,192	413,992	941,184
1947	514,195	384,605	898,800
1946	452,355	299.673	752,028
1945	520,887	269,844	790.731
1944	619,588	258.645	878,233
1943	653,884	190,755	844.639
1942	590.804	155,204	746,008
1941	619,365	212.808	832.173
1940	400,818	155 391	556,209
1939	331,421	134,647	466.068

U. S. Bureau of the Census.

HIGH ALLOY CASTINGS

Estimated Production by All United States Producers—Pounds

	Heat Resistant	Corrosion Resistant	Abrasion Resistant	Totals
1955	31,375,000*	23,992,000*	9,000,000*	64,367,000*
1st Qtr. ..	7,128,000†	6,218,000†	1,736,000†	15,082,000†
2nd Qtr. ..	8,101,000†	6.101,000†	2,361,000†	16,563,000†
3rd Qtr. ..	7.446,000†	5,273,000†	1,903,000†	14,622,000†
4th Qtr. ..	8,700,000*	6,400,000*	3.000,000*	18,100,000*
1954	29,108,300	24,316,300	8,426,600	61,851,200
1st Qtr. ..	8,562,500	5,970,800	1,932,600	16,465,900
2nd Qtr. ..	7,863,000	5,983,900	2,474,400	16,321,300
3rd Qtr. ..	6,381,600	5,872,800	744,200	12,998,600
4th Qtr. ..	6,301,200	6,488,800	3,275,400	16,065,400

*Estimated. †Preliminary.

Alloy Casting Institute.

	Heat Resistant	Corrosion Resistant	Abrasion Resistant	Totals
1953	39,311,600	29,151,600	8,706,900	77,170,100
1952	40,807,600	26,197,800	7,827,500	74,832,900
1951	38,277,000	28,771,600	6,132,300	73,180,900
1950	26,894,000	19,033,200	3,321,200	49,248.400
1949	19,791,700	12,997,100	1,500,700	34,289,500
1948	24,030,400	16,285,200	2,525,300	42,840,900
1947	21,505,100	16,346,900	1,534,500	39,386,500
1946	20,398,800	15,150,400	1,860,700	37,409,900
1945	23.002,700	12,276,200	1,482,000	36,760,900
1944	27,698,800	9,662,100	1,365,700	38,726,600
1943	33.245,400	10,726,900	2,116,900	46,089.200

NONFERROUS CASTINGS

Zinc and Zinc-Base Alloy Castings

Shipments—Thousands of Pounds

	Die	All Other	Total
1955			
9 Mos.	557,390	6,125	563,515
Jan.	57,915	671	58,586
Feb.	57,913	672	58,585
Mar.	71,073	738	71,811
Apr.	70,876	719	71,595
May	63,025	710	63,735
June	65,903	666	66,569
July	47,389	539	47,928
Aug.	61,957	720	62,677
Sept.	61,339	690	62,029
Oct.	.....	...	.....
Nov.	.....	...	.....
Dec.	.....	...	.....
1954	513,945	6,556	520,501
Jan.	42,886	645	43,531
Feb.	40,244	540	40,784
Mar.	49,501	687	50,188
Apr.	42,793	496	43,289
May	40,419	497	40,916
June	43,923	492	44,415
July	31,309	401	31,710
Aug.	37,599	494	38,093
Sept.	38,482	491	38,973
Oct.	41,652	550	42,202
Nov.	51,339	651	51,990
Dec.	53,798	612	54,410
1953	515,033	6,220	521,253
Jan.	45,662	457	46,119
Feb.	46,302	421	46,723
Mar.	50,977	563	51,540
Apr.	50,777	524	51,301
May	43,699	475	44,174
June	48,394	412	48,806
July	38,542	426	38,968
Aug.	37,374	426	37,800
Sept.	38,054	557	38,611
Oct.	40,282	600	40,882
Nov.	36,935	733	37,668
Dec.	38,035	626	38,661
1952	405 538	2,815	408,353
1951	474.937	4.059	478.996

U. S. Bureau of the Census.

Magnesium and Magnesium-Base Alloy Castings

Shipments—Thousands of Pounds

	1955	1954	1953	1952	1951
Jan.	2,305	2,451	3,112	3,238	2,232
Feb.	2,160	2,209	3,274	3,057	2,315
Mar.	2,572	2,425	3,403	3,040	2,593
Apr.	2,633	2,089	3,332	2,793	2,728
May	2,399	1,762	2,705	2,734	2,819
June	2,367	2,062	3,063	2,703	2,135
July	1,920	1,954	2,287	2,405	2,036
Aug.	2,176	2,190	2,490	2,478	2,738
Sept.	2,478	2,095	2,455	3,090	2,398
Oct.	....	2,092	3,024	3,250	2,816
Nov.	....	2,161	2,681	2,959	3,406
Dec.	....	2,287	2,691	3,110	2,609
Total	....	25,777	34,517	34,857	30,825

YEARLY SHIPMENTS

1950	15,224	1948	9,359
1949	11,053	1947	8,214

U. S. Bureau of the Census.

Copper and Copper-Base Alloy Castings

Shipments—Thousands of Pounds

	Sand	Permanent Mold	Die	Other	Total
1955					
9 Mos.	665,633	46,353	6,358	22,674	741,018
Jan.	64,540	4,678	591	2,424	72,233
Feb.	67,768	4,598	641	2,246	75,253
Mar.	83,149	5,649	742	2,609	92,149
Apr.	75,903	5,152	654	2,474	84,183
May	76,064	5,513	764	2,667	85,008
June	80,869	5,840	739	3,028	90,476
July	59,138	3,998	691	1,989	65,816
Aug.	77,721	5,322	844	2,413	86,300
Sept.	80 481	5,603	692	2,824	89,600
Oct.	.....	.....	.....	.....	......
Nov.	.....	.....	.....	.....	......
Dec.	.....	.....	.....	.....	......
1954	753,179	48,848	6,509	27,394	835,930
Jan.	63,034	4,618	816	2,969	71,437
Feb.	60,994	4,743	758	2,435	68,930
Mar.	68,052	5,123	875	2,530	76,580
Apr.	65,538	4,732	377	2,373	73,020
May	61,609	3,754	318	2,317	67,998
June	64,488	3,567	456	2,426	70,937
July	51,424	3,073	392	1,844	56,733
Aug.	63,589	3,547	459	1,496	69,091
Sept.	62,372	3,637	548	1,930	68,487
Oct.	63,855	3,619	521	2,281	70,276
Nov.	63,065	4,089	507	2,359	70,020
Dec.	65,159	4,346	482	2,434	72,421
1953	888,369	61,316	10,077	30,734	990,496
1952	910,862	63,865	8,259	26,924	1,009,910
1951	1,075,437	69,883	12,516	39,607	1,197,443
1950	953,590	55,614	15,099	32,670	1,056,973
1949	671,080	38,767	9,499	24,475	743,821
1948	947,044	60,552	13,642	29,217	1,050,455
1947	969,261	51,800	13.138	27,663	1.061.862

U. S. Bureau of the Census.

Aluminum and Aluminum-Base Alloy Castings

Shipments—Thousands of Pounds

	Sand	Permanent Mold	Die	Other	Total
1955					
9 Mos.	127,654	221,682	254,864	6,221	610.420
Jan.	13,358	23,679	26,819	558	64,414
Feb.	13,579	24,319	28,234	737	66,869
Mar.	16,019	29,029	33,229	682	78,958
Apr.	14,041	28,028	30,208	772	73.049
May	14,235	25,597	31,243	616	71,691
June	14,920	24,682	27,939	932	68,473
July	11,716	21,006	21,656	655	55,033
Aug.	14,916	22,267	27,004	576	64,763
Sept.	14,870	23,075	28.532	693	67.170
Oct.	.....	.....	.....	.....	......
Nov.	.....	.....	.....	.....	......
Dec.	.....	.....	.....	.....	......
1954	158,473	214,408	245,291	6,801	624,973
Jan.	14,698	16,615	20,826	424	52,563
Feb.	14,981	17,301	19,830	482	52,594
Mar.	14,818	19,606	23,851	495	58,770
Apr.	14,433	18,131	21,578	476	54,618
May	12,831	16,362	19,559	522	49,274
June	12,822	17,165	19,029	628	49,644
July	11,689	13,819	15,038	584	41,130
Aug.	11,642	15,415	15,835	629	43,521
Sept.	11,107	16,731	19,344	663	47,845
Oct.	12,765	19,238	22,247	653	54,903
Nov.	12,934	20,396	22,137	599	56,066
Dec.	13,753	23,629	26,017	646	64.045
1953	214,553	200,025	239,330	4,114	658,022
1952	194,616	146,883	169,732	7,748	518,979
1951	193,378	160,011	151,465	10,277	515,131
1950	184,782	181,366	167,201	9,733	543,082
1949	122,604	123,523	98,340	7,311	351,778
1948	153,845	183,627	128,903	5,242	471,617
1947	163,321	186,783	115,644	2,090	467,888

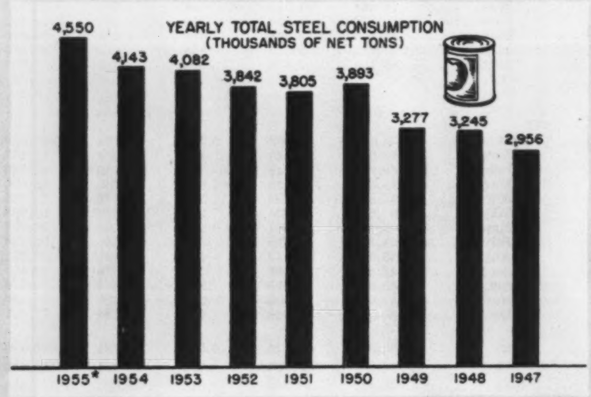
U. S. Bureau of the Census.

Containers & Closures

METALWORKING FACTS AND FIGURES

METAL CANS

Shipments in Terms of Net Tons of Steel Consumed



	Food Cans	Nonfood Cans	Total	For Sale
1955				
10 Mos.	2,485,657	1,465,894	3,951,551	3,467,498
Jan.	170,068	109,574	279,642	240,159
Feb.	154,507	105,078	259,585	224,128
Mar.	171,568	136,371	307,939	265,592
Apr.	178,528	142,753	321,281	273,649
May	222,797	156,970	379,767	330,050
June	230,016	167,783	397,799	347,471
July	266,148	161,286	427,434	386,053
Aug.	392,145	173,075	565,220	511,684
Sept.	355,914	155,515	511,429	443,363
Oct.	343,966	157,489	501,455	445,349
Nov.	......	......	......	......
Dec.	......	......	......	......
1954	2,605,124	1,538,205	4,143,329	3,657,604
Jan.	161,450	103,301	264,751	224,623
Feb.	158,093	102,106	260,199	225,743
Mar.	164,625	126,767	291,392	252,080
Apr.	188,262	135,777	324,039	278,428
May	180,705	136,961	317,666	276,313
June	224,254	156,922	381,176	339,473
July	249,376	155,776	405,152	368,035
Aug.	376,530	145,763	522,293	477,256
Sept.	328,454	129,529	457,983	408,415
Oct.	236,275	125,401	361,676	319,669
Nov.	166,975	106,641	273,616	239,881
Dec.	170,125	113,261	283,386	247,688
1953	2,614,764	1,467,490	4,082,254	3,571,489
Jan.	167,764	101,953	269,717	227,188
Feb.	151,803	100,554	252,357	215,860
Mar.	162,539	116,755	279,294	238,836
Apr.	174,879	129,759	304,638	255,795
May	177,976	127,229	305,205	259,822
June	220,481	137,286	357,767	311,575
July	299,306	147,466	446,772	407,362
Aug.	360,564	145,651	506,215	457,387
Sept.	346,645	137,916	484,561	432,830
Oct.	239,111	129,806	368,917	329,545
Nov.	190,280	124,128	314,408	280,289
Dec.	123,416	68,987	192,403	155,000
1952	2,554,874	1,287,296	3,842,170	3,340,899
1951	2,558,591	1,245,960	3,804,551	3,309,592
1950	2,550,949	1,342,435	3,893,384	3,423,602
1949	2,261,432	1,015,493	3,276,925	2,845,709
1948	2,317,487	927,658	3,245,145	2,771,104
1947	2,146,601	809,515	2,956,116	2,499,621

U. S. Bureau of the Census.

*Estimated.

Commercial Closures

Shipments—In Thousands of Units

	Metal Caps	Plastic Caps†
1955		
9 Mos.	10,432,173	2,092,103
Jan.	1,067,225	212,095
Feb.	1,075,984	205,849
Mar.	1,115,750	255,245
Apr.	1,023,075	231,978
May	1,142,274	228,118
June	1,288,259	234,915
July	1,116,671	204,375
Aug.	1,422 938	262,741
Sept.	1,179,997	256,787
Oct.	....	......
Nov.	....	......
Dec.	....	......
1954	12,705,438	2,543,837
Jan.	941,359	208,224
Feb.	1,024,866	204,532
Mar.	998,805	217,765
Apr.	1,114 580	228,729
May	1,061,904	194,921
June	1,192 991	216,849
July	1,089,155	183,174
Aug.	1,187,901	226,184
Sept.	1,140,792	228,467
Oct.	1,073,161	203,768
Nov.	961,863	229,578
Dec.	918 061	201,646
1953	11,854,403	2,609,220
1952	10,920,941	2,166,856
1951	11,038,609	2,760,724
1950	11,683,678	2,554,790

†Not including caps for collapsible tubes.
U. S. Bureau of the Census.

Tin Mill Products Consumed in Producing Closures

Consumption in Terms of Base Boxes

	Commercial Metal Caps	Crowns	Home Canning Closures†
1955			
9 Mos.	2,207,203	2,412,256	534,860
Jan.	224,024	230,784	50,288
Feb.	219,334	222,001	52,840
Mar.	260,796	240,445	70,575
Apr.	239,488	271,233	65,715
May	243,410	305,488	65 907
June	256,663	305,291	72,390
July	240,266	292,165	48,908
Aug.	271,958	294,979	80,336
Sept.	251,264	249,870	27,901
Oct.	......	......	.....
Nov.	......	......	.....
Dec.	......	......	.....
1954	2,629 231	3,014,165	658,935
Jan.	195,020	241,681	44,464
Feb.	213,839	260,813	39,704
Mar.	261,405	307,873	60,670
Apr.	243,946	302,462	68,973
May	224,511	292,869	66,605
June	265,491	289,123	68,948
July	204,165	282,926	54,381
Aug.	215,490	268,659	74,649
Sept.	207,386	213,825	59,988
Oct.	212,043	197,887	40,601
Nov.	199,846	177,793	39,464
Dec.	186,089	178,254	40,488
1953	2,461 563	3,158,560	685,042
1952	2,250,732	3,286,200	624,017

†Includes milk bottle closures.
U. S. Bureau of the Census.

Crowns

Shipments—In Gross

	1955	1954	1953
Jan.	23,833,434	21,412,694	16,879,383
Feb.	23,993,295	32,118,979	16 748,184
Mar.	29,479,911	30,977,223	22,116,867
Apr.	27,982,361	27,096 400	26,287,628
May	30 691,179	24,038,085	27,652,326
June	33,639,920	30,543,664	36,203,200
July	28,318,780	31,191,929	36,842,978
Aug.	33,045,760	28,514 461	32 214,489
Sept.	27,363,808	24,518,291	30,086,953
Oct.	....	21,437,339	24,807,103
Nov.	....	20,417,819	21,740,261
Dec.	....	21,474,381	24,377,081
Total	....	313,741,265	315,956,453

YEARLY TOTALS

1952.... 352,416,643	1951.... 318,054,646

U. S. Bureau of the Census.

Aluminum Consumed in Producing Closures

Pounds

	Commercial Closures	Milk Bottle Closures	Foil Liners	Total
1955				
Jan.	623.797	437.399	164.111	1,225.307
Feb.	644.472	487.511	163.782	1,295.765
Mar.	842.672	605.666	197.166	1,645.504
Apr.	874.140	504.805	223.699	1,602.644
May	876.680	463.813	245.205	1,585.698
June	1,001.154	503.546	271.971	1,776.671
July	961.112	413.954	227,541	1,602,607
Aug.	1,084.028	535.283	228.742	1,848,053
Sept.	926,582	559.314	184,074	1,669.970
1954	9,072,888	4,846,299	2,423,771	16,342,958
Jan.	520.573	449.416	165,217	1,135,206
Feb.	755.482	369.983	192.895	1,318.360
Mar.	745.873	403.120	205.449	1,354.442
Apr.	832.665	379.663	229.256	1,441.584
May	902.972	343.140	210.702	1,456,814
June	1,046.065	413.786	245,852	1,705.703
July	888.244	365.354	238.122	1,491.720
Aug.	811,463	394.954	260.354	1,466.771
Sept.	766.576	428.832	214.544	1,409.952
Oct.	489.313	421.254	155.492	1,066,059
Nov.	636.351	394.160	140.698	1,171.209
Dec.	677.311	482.637	165,190	1,325.138
1953	7,343,038	4,866,235	2,487,769	14,697,042

Heavy Steel Barrels and Drums

Shipments for Sale—Number of Units

	1955	1954	1953
Jan.	1.742.274	1.599.615	1,797,506
Feb.	1.746.912	1,680.540	1.669.709
Mar.	2.124.565	1,950.222	1,981,128
Apr.	1.989.904	1.892.472	2.067.720
May	2.062.366	1.908.422	2.053.829
June	2.513.715	2.038.009	2.086.112
July	2.077.593	1.848.190	1.975.012
Aug.	2.230.442	1.784.802	2.025.511
Sept.	2,032,407	1,901.506	1,950.491
Oct.	....	1,868.475	2,100.630
Nov.	....	1,781,680	1,847,667
Dec.	....	1,796,826	2,003,125

YEARLY TOTALS

1954	22,050,759	1950	26,240,548
1953	23,558,440	1949	23,109,638
1952	24,028,291	1948	27,069,717
1951	29,762,990	1947	27,061,963

Light Steel Barrels and Drums

Shipments for Sale—Number of Units

	1955	1954	1953
Jan.	628.807	564.291	651.178
Feb.	621.581	587.896	585.598
Mar.	718.460	632.184	640,831
Apr.	725.041	662.055	735.195
May	797,831	642.451	706.174
June	838.930	744.421	709.566
July	742.430	669.119	656.568
Aug.	794,145	579.225	578.605
Sept.	777,328	611,782	640.062
Oct.	......	675,116	637.557
Nov.	......	689.264	606.353
Dec.	......	679,395	592,982

YEARLY TOTALS

1954	7,737,199	1950	7,816,535
1953	7,740,669	1949	6.079,913
1952	7,602,519	1948	7.346,312
1951	8,290,340	1947	6,032,304

Steel Shipping Packages, Kegs and Pails

Shipments for Sale—Number of Units

	1955	1954	1953
Jan.	5.036.886	5.324.534	4,812.218
Feb.	4.859.792	5.084.205	4.756.026
Mar.	6,147.901	5.842 678	5.361.330
Apr.	6.441.670	5.994.364	6.346.580
May	6.779.107	5.552.442	6.064.044
June	7.399.292	6.118.740	6,265.319
July	6.625.379	6.018.663	6.136.394
Aug.	7,254.761	5.838.528	5.490.724
Sept.	6,470,152	5.782.122	5.868.223
Oct.	....	5.597.724	5.946.503
Nov.	....	4.951.381	5.093.467
Dec.	....	4,956,950	4,867,098

YEARLY TOTALS

1954	67,062.331	1951	73,681,180
1953	67.007.926	1950	66,128,702
1952	61,285,782	1949	52,765,170

U. S. Bureau of the Census.

STEEL & IRON REQUIRED FOR MODERN-DAY PRODUCTS

Figures show pounds required to make item or required for installation except where finished weight is specified. The weights are not intended to be typical or average. Rather, they are for particular models or types.

PRODUCT	Date estimate was published	IRON AND STEEL (pounds)
Bus (50 seats)	Dec. 1951	12,918
Desk (60 x 30 x 29 inches), finished weight	Dec. 1952	245.81
Freight Cars:	June 1949	
Box Car (40 ft 6 in.), 50-ton capacity		41.540
Covered Hopper, 70-ton capacity		52,940
Flat, 50-ton capacity		47,660
Hopper, 50-ton capacity		41,920
Ore, 70-ton capacity		42,300
Refrigerator, 40-ton capacity		43,940
Grain Combine	June 1950	6,829.77
Hay Baler (10 tons per hour capacity)	Oct. 1951	3,716.58
Lathe, Turret (standard size)	Apr. 1947	8,056
Locomotive, Diesel-Electric, 1500 hp	Apr. 1949	200,700
Motor, Electric (finished weight), ¼ hp	June 1952	18.76
Motor, Electric (finished weight), 5000 hp	June 1952	178,000
Printing Press (4-color, sheet fed gravure)	Oct. 1950	110,900
Railroad Freight Car Truck	Oct. 1949	6,868
Railroad Passenger Car Truck	Oct. 1949	18,460
Railroad Sleeping Car (21-roomette)	June 1951	115,662
Ship, "Independence"	Aug. 1951	37,090,000
		STEEL‡
Automobile (1952 model 4-door sedan)	Oct. 1953	3,542
Bicycle (man's 26-inch deluxe)	Oct. 1952	63.81
Lawn Mower (hand operated)	June 1947	27.60
Tractor, Farm (Wheel type)	Dec. 1946	1,542.82

Containers, by types (finished weight): Feb. 1948

Baby Food	1.888 oz	Lard (3-pound)	8.288 oz
Condensed Milk	2.48 oz	Meat (Square, 12-ounce)	2.848 oz
Fish (Sardine, No. 1 flat)	2.5 oz	Olive Oil (Square, 1-quart)	4.96 oz
Fish (Tuna, No. 1)	3.168 oz	Paint (1-gallon)	15.968 oz
Fruit (No. 3)	5.344 oz	Soup (No. 2)	3.808 oz
Fruit Juice (No. 10)	11.08 oz	Vegetable (No. 5)	5.92 oz
Grease (1-pound)	3.776 oz		

House, Six-Room§ (finished weights): ....Oct. 1949

Bathroom	300	Lath	1,800
Conduit	140	Laundry (see below)	...
Doors, Steel	160	Nails and Wire	600
Flashing and Miscellaneous Sheets	200	Pipe	1,200
Frames and Sills	480	Radiator Grills	75
Gutters and Downspouts	475	Screen	32
Hardware	90	Structural Shapes and Columns	680
Heating Equipment	640	Windows	800
Kitchen (see below)	...		

Kitchen—Laundry Combination† (finished weights): ......Apr. 1953

Clothes Dryer	216	Refrigerator	229
Clothes Washer	216	Sink Bowl (double)	22
Dish Washer with Cabinet.	150	Stainless Trim for Counter Edge	2
Electrical Raceway System	63	Steel Stool	15
Freezer	283	Stove	254
Garbage Disposal Unit	15	Toaster	7
Ironer	186	Utensils and Cutlery	50
Kitchen Cabinets	887	Venetian Blinds (2)	14
Metal Table with Porcelain Enamel Top	35	Ventilator for Stove	7
Mixer	8		

Tools, Garden: ....June 1955

Fifteen-tooth Bow Rake	2.91	Hedge Shears	3.10
Four-pound Single Bit Ax.	6.09	Medium-weight Spading Fork	2.62
Four-tooth Garden Cultivator	0.74	Pruning Shears	1.12
Garden Hoe	1.21	Short-handled Grass Hook.	0.84
Garden Spade	4.83	Turf Edger	1.77
Garden Trowel	0.90	Weed Scythe Blade	2.54
Grass and Weed Cutter	1.87		

Tools, Hand: ....Feb. 1953

Ball Peen Hammer	1.64	Mechanic's Double End Wrench	0.442
Chisel	6.8 oz	Pick	6.36
Combination Pliers	10.8 oz	Sledge	10.6
Crow Bar	19.08	Solid Punch	2.18 oz
Drift Pin	1.1	Standard Screw Driver	0.27
Four-Way Wrench	2.33	Timber Felling Wedge	5.3
Mattock	5.3	Wrench	2.75
Maul	10.6		

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‡Iron, if any, not determined. In pounds unless otherwise indicated.

§Not all the uses listed are necessarily found together in the same house, although they may be. The list indicates where steel has been found advantageous.

†List does not give all possible uses of steel in a kitchen, and is intended only to indicate the many functions of steel in a modern kitchen.

American Iron & Steel Institute.

Prices

METALWORKING FACTS AND FIGURES

1955 WEEKLY INDEX OF FINISHED STEEL PRICES

U. S. Bureau of Labor Statistics—1947-1949=100

Week Ended	Index	Week Ended	Index	Week Ended	Index	Week Ended	Index
Jan. 4......	144.6	Apr. 5......	144.7	July 5......	144.9	Oct. 4......	154.5
Jan. 11......	144.6	Apr. 12......	144.8	July 12......	153.8	Oct. 11......	154.5
Jan. 18......	144.7	Apr. 19......	144.8	July 19......	153.9	Oct. 18......	154.5
Jan. 25......	144.7	Apr. 26......	144.8	July 26......	153.9	Oct. 25......	154.5
Jan. Av. ..	144.6	Apr. Av. ..	144.8	July Av. ..	153.8	Oct. Av. ..	154.5
Feb. 1......	144.7	May 3......	144.8	Aug. 2......	153.9	Nov. 1......	154.5
Feb. 8......	144.7	May 10......	144.8	Aug. 9......	153.9	Nov. 8......	154.5
Feb. 15......	144.7	May 17......	144.8	Aug. 16......	153.9	Nov. 15......	154.5
Feb. 22......	144.7	May 24......	144.8	Aug. 23......	153.9	Nov. 22......	154.6
Feb. Av. ..	144.7	May 31......	144.8	Aug. 30......	153.9	Nov. 29......	154.6
		May Av. ..	144.8	Aug. Av. ..	153.9	Nov. Av. ..	154.5
Mar. 1......	144.7	June 7......	144.8				
Mar. 8......	144.7	June 14......	144.8	Sept. 6......	153.9	Dec. 6......	154.6
Mar. 15......	144.7	June 21......	144.9	Sept. 13......	153.9	Dec. 13......	....
Mar. 22......	144.7	June 28......	144.9	Sept. 20......	153.9	Dec. 20......	....
Mar. 29......	144.7	June Av. ..	144.8	Sept. 27......	153.9	Dec. 27......	....
Mar. Av. ..	144.7			Sept. Av. ..	153.9	Dec. Av. ..	....

Beehive Metallurgical Coke

Average Price—Net Ton

	1955	1954	1953	1952
Connellsville, furnace	$13.70	$14.50	$14.75	$14.75
Connellsville, foundry	16.65	16.75	16.82	17.24

Oven Foundry Coke

Average Price—Net Ton

Ovens	1955	1954	1953	1952
Kearny, N. J...	$24.77	$24.00	$24.00	$22.85
Milwaukee	25.69	25.25	25.25	23.88
Chicago	25.05	24.50	24.50	23.13

Lake Superior Iron Ore

(Per gross ton; 51½% iron)

	1955	1954	1953	1952
Bessemer Old Range..	$10.40	$10.30	$10.04	$9.02
Bessemer Mesabi	10.25	10.05	9.79	8.77
Nonbessemer Old Range	10.25	10.15	9.89	8.87
Nonbessemer Mesabi..	10.10	9.90	9.64	8.62
High Phosphorus	10.00	9.90	9.64	8.62

FINISHED STEEL—WEIGHTED PRICE COMPOSITE

(Based on average shipments and prices of the following products during 5-year base period 1935-1939: Structural shapes, plates, rails, hot-rolled and cold-finished bars, pipe, wire, nails, tin plate, hot and cold-rolled sheets, galvanized sheets, hot and cold-rolled strip)

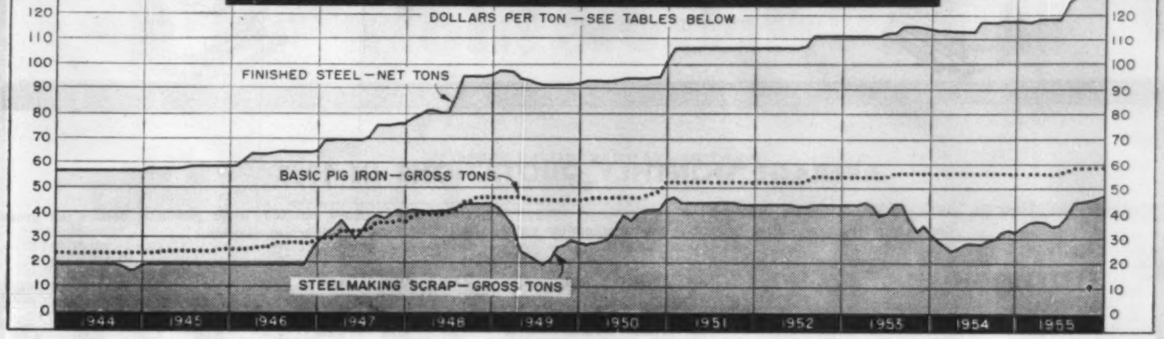
	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Avg.
1955..	194.53	194.53	194.53	194.53	194.53	194.53	207.59	207.56	207.56	208.90	208.90	208.90	201.38
1954..	189.74	189.74	189.74	189.74	189.74	189.75	194.19	194.19	194.19	194.53	194.53	194.53	192.05
1953..	181.31	181.31	181.31	181.31	182.24	186.06	189.35	189.38	189.80	189.91	189.91	189.74	185.97
1952..	171.92	171.92	171.92	171.92	171.92	171.92	173.83	181.31	181.31	181.31	181.31	181.31	175.99
1951..	171.92	171.92	171.92	171.92	171.92	171.92	171.92	171.92	171.92	171.92	171.92	171.92	171.92
1950..	156.13	156.13	156.13	156.13	156.13	156.54	156.69	156.95	156.99	157.53	157.76	167.87	157.57
1949..	155.05	155.05	154.85	154.01	152.90	152.90	152.80	152.52	152.52	152.52	152.52	154.75	153.53
1948..	132.93	134.56	135.91	135.91	135.02	134.56	143.08	151.99	151.86	151.86	151.86	151.86	142.62
1947..	117.90	118.67	118.67	118.67	118.67	118.67	120.39	128.96	128.96	128.96	129.28	129.28	123.09
1946..	101.87	106.82	111.62	111.62	111.62	111.86	112.04	112.04	112.04	112.04	112.04	112.82	110.70
1945..	100.32	100.65	100.65	100.65	101.10	101.78	101.78	101.85	101.87	101.87	101.87	101.87	101.36
1944..	99.16	99.16	99.16	99.16	99.16	99.16	99.16	99.16	99.16	99.16	99.16	99.16	99.16
1943..	99.16	99.16	99.16	99.16	99.16	99.16	99.16	99.16	99.16	99.16	99.16	99.16	99.16
1942..	99.16	99.16	99.16	99.16	99.16	99.16	99.16	99.16	99.16	99.16	99.16	99.16	99.16
1941..	99.16	99.16	99.16	99.16	99.16	99.16	99.16	99.16	99.16	99.16	99.16	99.16	99.16
1940..	99.16	99.16	99.16	97.75	99.16	99.16	99.16	99.16	99.16	99.16	99.16	99.16	99.04
1939..	100.50	100.50	100.50	100.50	99.07	98.46	98.42	98.42	98.42	98.54	98.78	99.16	99.27

FINISHED STEEL—ANNUAL PRICE AVERAGES

(Per net ton, Pittsburgh)

	SHEETS			STRIP		Tin Plate	BARS		Plates	Shapes	Basic Wire	Standard Nails
	H.R.	C.R.	Gal.	H.R.	C.R.		H.R.	C.F.				
1955	$83.75	$102.75	$113.00	$83.75	$120.12	$183.00	$89.50	$113.00	$87.25	$88.50	$120.00	$144.50
1954	79.75	97.25	107.25	79.75	112.00	179.50	84.50	106.00	83.25	83.50	112.75	134.00
1953	77.60	93.70	103.70	85.34	111.25	179.00	81.20	101.52	80.20	79.75	108.26	129.08
1952	74.52	88.95	98.38	79.51	104.39	176.17	76.17	94.25	75.73	74.73	101.88	123.03
1951	73.00	87.00	96.00	77.60	101.60	174.00	74.00	91.00	74.00	73.00	98.60	120.00
1950	67.50	82.42	88.67	68.33	86.29	150.00	69.42	83.29	70.33	68.42	91.13	107.67
1949	65.22	80.08	88.00	67.75	84.33	155.00	67.55	80.04	68.75	65.24	84.05	105.92
1948	60.17	74.83	82.80	62.40	80.36	135.75	62.84	75.63	63.84	60.17	80.10	107.33
1947	52.60	67.03	74.05	52.60	67.03	116.00	54.60	67.03	55.53	52.53	70.67	84.44
1946	48.03	64.80	79.50	47.33	60.56	104.38	49.46	61.21	49.38	46.38	60.25	69.61
1945	43.92	61.00	73.50	42.00	56.00	100.00	44.25	53.83	44.50	42.00	53.83	57.08
1944	42.00	61.00	70.00	42.00	56.00	100.00	43.00	53.00	42.00	42.00	52.00	51.00
1943	42.00	61.00	70.00	42.00	56.00	100.00	43.00	53.00	42.00	42.00	52.00	51.00
1942	42.00	61.00	70.00	42.00	56.00	100.00	43.00	53.00	42.00	42.00	52.00	51.00
1941	42.00	61.00	70.00	42.00	56.00	100.00	43.00	53.00	42.00	42.00	52.00	51.00
1940	41.80	60.80	70.00	41.75	55.75	100.00	43.00	53.00	42.00	42.00	52.00	51.00
1939	41.25	62.08	70.00	41.25	57.08	100.00	43.75	53.33	42.00	42.00	52.00	49.17
1938	45.42	66.67	72.92	45.25	61.08	106.00	47.00	56.00	43.50	43.50	55.00	52.00
1937	47.08	69.92	74.50	47.08	62.75	104.33	48.08	56.75	44.25	44.25	56.92	53.25
1936	38.25	60.00	63.25	38.25	52.33	105.00	38.50	44.42	37.00	37.00	48.17	42.83
1935	37.00	59.00	62.00	37.00	52.00	105.00	36.33	40.00	36.00	36.00	46.00	50.58
1934	37.08	58.75	61.25	37.17	51.75	105.00	36.17	42.00	35.67	35.67	45.42	50.58
1933	33.17	51.83	54.92	31.83	42.17	88.67	32.75	36.08	32.17	32.50	42.25	39.92

COMPARISON OF PRICE COMPOSITES



FINISHED STEEL—ARITHMETICAL PRICE COMPOSITE

(In dollars per net ton, computed from industry-wide prices on carbon steel: Hot-rolled sheets, cold-rolled sheets, cold-rolled strip, hot-rolled bars, plates, structural shapes, basic wire, standard nails, tin plate and standard and line pipe. Based on basing point prices through June. 1948; mill prices for subsequent months.)

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Avg.
1955	$117.82	$117.82	$118.40	$118.45	$118.45	$118.45	$124.59	$127.41	$127.41	$128.14	$128.14	$127.95	$122.75
1954	113.91	113.91	113.75	113.70	113.70	113.20	117.52	117.74	117.77	117.95	117.95	117.95	115.75
1953	110.98	110.98	110.98	110.98	111.13	112.49	112.51	115.56	115.56	115.42	115.18	114.41	113.02
1952	106.32	106.32	106.32	106.32	106.32	106.32	107.25	110.98	110.98	110.98	110.98	110.98	108.34
1951	106.32	106.32	106.32	106.32	106.32	106.32	106.32	106.32	106.32	106.32	106.32	106.32	106.32
1950	92.92	93.09	93.18	93.19	93.65	94.35	94.36	94.44	94.50	94.91	95.09	100.76	94.54
1949	97.75	97.77	97.17	94.18	93.36	92.06	91.82	91.62	91.55	91.62	91.64	91.89	93.54
1948	78.26	79.86	81.14	81.14	80.27	80.27	86.18	95.05	95.05	95.05	95.16	95.50	86.91
1947	69.59	69.82	69.82	69.82	69.82	69.82	70.80	75.41	75.41	75.41	76.09	76.15	72.33
1946	58.27	60.91	63.54	63.54	63.54	64.09	64.45	64.45	64.45	64.45	64.45	64.75	63.41
1945	57.35	57.55	57.55	57.55	57.73	58.27	58.27	58.27	58.27	58.27	58.27	58.27	57.97
1944	56.73	56.73	56.73	56.73	56.73	56.73	56.73	56.73	56.73	56.73	56.73	56.73	56.73

STEELMAKING SCRAP PRICE COMPOSITE

Average of No. 1 heavy melting steel scrap prices (per gross ton) at Pittsburgh, Chicago and eastern Pennsylvania.

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Avg.
1955	$34.95	$36.79	$37.50	$36.73	$34.87	$35.44	$39.67	$43.97	$44.42	$45.17	$46.08	$48.83	$40.37
1954	29.05	26.91	24.37	25.67	28.00	27.92	27.42	28.80	29.94	32.25	33.33	32.58	28.85
1953	43.00	43.00	44.05	42.88	39.17	40.50	43.51	43.40	36.93	32.75	35.00	32.10	39.69
1952	43.00	43.00	43.00	43.00	43.00	42.63	42.60	43.00	43.00	43.00	43.00	43.00	42.94
1951	46.33	44.00	44.00	44.00	44.00	44.00	44.00	44.00	44.00	43.60	43.00	43.00	43.99
1950	26.93	27.52	28.23	29.40	33.82	39.25	37.04	40.00	40.93	41.37	41.33	45.50	35.94
1949	41.54	38.48	34.60	24.06	22.29	20.85	19.21	20.86	26.07	26.71	28.96	28.03	27.64
1948	40.75	40.48	40.21	40.41	40.67	40.67	41.43	43.33	43.33	43.25	43.25	43.25	41.75
1947	31.20	33.50	37.25	33.94	29.75	32.48	37.23	39.00	37.83	39.85	40.42	40.13	36.05
1946	19.17	19.17	19.17	19.17	19.17	19.17	19.17	19.17	19.17	19.17	22.22	27.69	20.13
1945	19.17	19.17	19.17	19.17	19.17	19.17	19.17	19.17	19.17	19.17	19.17	19.17	19.17
1944	19.17	19.17	19.17	19.17	19.17	19.17	19.17	19.17	18.00	16.50	16.40	18.54	18.95

BASIC PIG IRON PRICE COMPOSITE

Average of basic pig iron prices (per gross ton) at Bethlehem, Birmingham, Buffalo, Chicago, Cleveland. Pittsburgh, Granite City, Youngstown.

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Avg.
1955	$56.04	$56.04	$56.04	$56.04	$56.04	$56.04	$57.88	$58.49	$58.49	$58.49	$58.49	$58.49	$57.29
1954	56.04	56.04	56.04	56.04	56.04	56.04	56.04	56.04	56.04	56.04	56.04	56.04	56.04
1953	54.66	54.66	54.66	54.66	54.66	54.66	56.03	56.04	56.04	56.04	56.04	56.04	55.35
1952	52.16	52.16	52.16	52.16	52.16	52.16	52.66	54.66	54.66	54.66	54.66	54.66	53.24
1951	52.16	52.16	52.16	52.16	52.16	52.16	52.16	52.16	52.16	52.16	52.16	52.16	52.16
1950	45.70	45.97	45.97	45.97	45.97	45.97	45.97	45.97	47.08	47.98	49.04	52.16	46.98
1949	46.26	46.22	46.22	46.16	45.66	45.60	45.60	45.60	45.60	45.60	45.60	45.60	45.81
1948	38.50	39.30	39.34	39.21	39.66	40.49	41.42	44.12	44.62	46.19	46.29	46.29	42.12
1947	29.56	29.59	32.40	32.49	32.49	32.49	33.82	36.06	36.14	36.18	36.38	36.31	33.66
1946	24.75	24.75	25.13	25.50	25.50	27.50	27.50	27.50	27.50	27.50	27.50	29.10	26.64
1945	23.00	23.50	24.00	24.00	24.00	24.00	24.00	24.00	24.00	24.19	24.75	24.75	24.01

MALLEABLE PIG IRON PRICE COMPOSITE

Average of malleable pig iron prices (per gross ton) at Bethlehem, Buffalo, Chicago, Cleveland, Pittsburgh, Granite City, Youngstown.

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Avg.
1955	$57.27	$57.27	$57.27	$57.27	$57.27	$57.27	$59.15	$59.77	$59.77	$59.77	$59.77	$59.77	$58.47
1954	57.27	57.27	57.27	57.27	57.27	57.27	57.27	57.27	57.27	57.27	57.27	57.27	57.27
1953	55.77	55.77	55.77	55.77	55.77	55.77	57.27	57.27	57.27	57.27	57.27	57.27	56.52
1952	53.27	53.27	53.27	53.27	53.27	53.27	53.77	55.77	55.77	55.77	55.77	55.77	54.35
1951	53.27	53.27	53.27	53.27	53.27	53.27	53.27	53.27	53.27	53.27	53.27	53.27	53.27
1950	47.27	47.27	47.27	47.27	47.27	47.27	47.33	47.49	48.15	49.46	50.27	53.27	48.30
1949	47.39	47.34	47.34	47.31	47.27	47.27	47.27	47.27	47.27	47.27	47.27	47.27	47.30
1948	39.58	40.39	40.45	40.29	40.70	41.54	42.32	44.87	45.30	47.20	47.41	47.41	43.12
1947	30.79	30.79	33.50	33.71	33.71	33.71	34.94	37.07	37.16	37.19	37.49	37.40	34.79
1946	26.04	26.04	26.41	26.79	26.79	28.79	28.79	28.79	28.79	28.79	28.79	30.36	27.93
1945	24.29	24.79	25.29	25.29	25.29	25.29	25.29	25.29	25.29	25.48	26.04	26.04	25.31

No. 2 FOUNDRY PIG IRON PRICE COMPOSITE

Average of No. 2 foundry pig iron prices (per gross ton) at Bethlehem, Birmingham, Buffalo, Chicago. Cleveland, Neville Island, Granite City.

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Avg.
1955	$56.54	$56.54	$56.54	$56.54	$56.54	$56.54	$58.38	$58.99	$58.99	$58.99	$58.99	$58.99	$57.71
1954	56.54	56.54	56.54	56.54	56.54	56.54	56.54	56.54	56.54	56.54	56.54	56.54	56.54
1953	55.04	55.04	55.04	55.04	55.04	55.04	56.54	56.54	56.54	56.54	56.54	56.54	55.79
1952	52.54	52.54	52.54	52.54	52.54	52.54	53.04	55.04	55.04	55.04	55.04	55.04	53.62
1951	52.54	52.54	52.54	52.54	52.54	52.54	52.54	52.54	52.54	52.54	52.54	52.54	52.54
1950	46.20	46.47	46.47	46.47	46.47	46.47	46.57	46.85	47.55	49.20	49.54	52.54	47.57
1949	47.39	47.34	47.34	47.31	47.27	47.27	46.08	46.10	46.10	46.10	46.10	46.10	46.28
1948	38.94	39.77	39.81	39.68	40.10	40.96	41.83	44.47	44.58	46.50	46.69	46.69	42.50
1947	30.17	30.17	32.80	32.99	32.99	32.99	34.32	36.54	36.62	36.64	36.85	36.78	34.16
1946	25.42	25.42	25.80	26.17	26.17	28.17	28.17	28.17	28.17	28.17	28.17	29.73	27.31
1945	23.67	24.17	24.67	24.67	24.67	24.67	24.67	24.67	24.67	24.86	25.42	25.42	24.69

Prices

METALWORKING FACTS AND FIGURES

AVERAGE MONTHLY QUOTATIONS IN 1955

Finished steel prices are cents per pound unless otherwise noted; coke and ammonium sulphate, dollars per net ton; other products, dollars per gross ton. All prices are mill or furnace, unless otherwise noted. December figures subject to revision.

PITTSBURGH	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.
Structural Shapes	4.25	4.25	4.25	4.25	4.25	4.25	4.60	4.60	4.60	4.60	4.60	4.60
Plates	4.225	4.225	4.225	4.225	4.225	4.225	4.50	4.50	4.50	4.50	4.50	4.50
Bars, Hot-Rolled	4.30	4.30	4.30	4.30	4.30	4.30	4.65	4.65	4.65	4.65	4.65	4.65
Bars, Cold-Finished	5.40	5.40	5.40	5.40	5.40	5.40	5.90	5.90	5.90	5.90	5.90	5.90
Sheets, Hot-Rolled	4.05	4.05	4.05	4.05	4.05	4.05	4.325	4.325	4.325	4.325	4.325	4.325
Sheets, Cold-Rolled	4.95	4.95	4.95	4.95	4.95	4.95	5.325	5.325	5.325	5.325	5.325	5.325
Sheets, Galvanized	5.45	5.45	5.45	5.45	5.45	5.45	5.85	5.85	5.85	5.85	5.85	5.85
Strip, Hot-Rolled	4.05	4.05	4.05	4.05	4.05	4.05	4.325	4.325	4.325	4.325	4.325	4.325
Strip, Cold-Rolled	5.75	5.75	5.75	5.75	5.75	5.75	6.284	6.25	6.25	6.25	6.25	6.25
Standard Spikes	7.30	7.30	7.30	7.30	7.30	7.30	7.90	7.90	7.90	7.90	7.90	7.90
Plain Wire	5.75	5.75	5.75	5.75	5.75	5.75	6.25	6.25	6.25	6.25	6.25	6.25
Wire Nails	6.85	6.85	6.85	6.85	6.85	6.85	7.60	7.60	7.60	7.60	7.60	7.60
Structural Rivets	9.25	9.25	9.25	9.25	9.25	9.25	9.60	9.95	9.95	9.95	9.95	9.95
Steel Pipe, Buttweld 1-3 in.; % discount from list	31.75	31.75	31.75	31.75	31.75	31.75	25.50	25.50	25.50	25.50	25.50	25.50
Tin Plate, 1.50-lb coating (base box)	$9.05	$9.05	$9.05	$9.05	$9.05	$9.05	$9.05	$9.05	$9.05	$9.45	$9.45	$9.45
Pig Iron, Bessemer, Pittsburgh district ovens	57.00	57.00	57.00	57.00	57.00	57.00	58.88	59.50	59.50	59.50	59.50	59.50
Pig Iron, Basic, Pittsburgh district ovens	56.00	56.00	56.00	56.00	56.00	56.00	57.88	58.50	58.50	58.50	58.50	58.50
Pig Iron, No. 2 Foundry, Neville Island	56.50	56.50	56.50	56.50	56.50	56.50	58.38	59.00	59.00	59.00	59.00	59.00
Pig Iron, Malleable, Neville Island	56.50	56.50	56.50	56.50	56.50	56.50	58.38	59.00	59.00	59.00	59.00	59.00
Blast Furnace Silvery Pig Iron, 9.01-9.50% Si, Jackson, O., furnace	71.00	71.00	71.00	71.00	71.00	71.00	72.88	73.50	73.50	73.50	73.50	73.50
Billets, Bessemer and Open-Hearth, Rerolling	64.00	64.00	64.00	64.00	64.00	64.00	68.50	68.50	68.50	68.50	68.50	68.50
Wire Rods (cents per pound)	4.675	4.675	4.675	4.675	4.675	4.675	5.025	5.025	5.025	5.025	5.025	5.025
Coke, Furnace, Beehive, spot, Connellsville, Pa.	$13.75	$13.75	$13.75	$13.75	$13.75	$13.75	$13.75	$13.65	$13.625	$13.625	$13.625	$13.625
Coke, Foundry, Beehive, spot, Connellsville, Pa.	16.75	16.75	16.75	16.75	16.75	16.75	16.75	16.55	16.50	16.50	16.50	16.50
Scrap, No. 1 Heavy Melting Steel	36.13	37.45	38.50	37.00	34.70	34.75	39.88	43.90	43.50	44.50	45.50	47.50
Scrap, Low Phos. (Punchings and Plate)	39.00	41.50	42.50	41.25	39.30	38.75	41.50	47.10	49.00	49.50	49.50	50.50
Scrap, No. 1 Cupola Cast	36.50	37.90	38.75	39.50	39.50	39.50	39.75	40.70	42.25	42.50	42.50	43.50

CHICAGO	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.
Bars, Steel	4.30	4.30	4.30	4.30	4.30	4.30	4.65	4.65	4.65	4.65	4.65	4.65
Plates	4.225	4.225	4.225	4.225	4.225	4.225	4.50	4.50	4.50	4.50	4.50	4.50
Structural Shapes	4.25	4.25	4.25	4.25	4.25	4.25	4.60	4.60	4.60	4.60	4.60	4.60
Bars, Merchant, Rail Steel	4.25	4.25	4.25	4.25	4.25	4.25	4.60	4.60	4.60	4.60	4.625	4.65
Sheets, Cold-Rolled	4.95	4.95	4.95	4.95	4.95	4.95	5.325	5.325	5.325	5.325	5.325	5.325
Pig Iron, No. 2 Foundry	$56.50	$56.50	$56.50	$56.50	$56.50	$56.50	$58.38	$59.00	$59.00	$59.00	$59.00	$59.00
Pig Iron, Malleable	56.50	56.50	56.50	56.50	56.50	56.50	58.38	59.00	59.00	59.00	59.00	59.00
Oven Foundry Coke	24.50	24.50	24.50	24.50	24.50	24.82	25.75	25.75	25.75	25.75	25.75	25.75
Scrap, No. 1 Heavy Melting Steel	34.75	34.10	35.25	35.50	34.00	34.25	38.25	42.00	43.25	44.50	45.25	49.00
Scrap Rails for Rerolling	52.13	49.50	50.00	52.50	51.90	51.75	58.25	64.50	64.75	65.50	67.00	73.50
Scrap, No. 1 Cupola Cast	40.00	40.00	40.38	41.25	40.50	41.75	44.50	46.10	47.50	48.10	48.25	49.50

EASTERN PENNSYLVANIA	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.
Plates, Sparrows Point, Md.	4.225	4.225	4.225	4.225	4.225	4.225	4.50	4.50	4.50	4.50	4.50	4.50
Structural Shapes, deld. Philadelphia	4.53	4.53	4.53	4.53	4.53	4.53	4.88	4.88	4.88	4.88	4.88	4.88
Steel Bars, deld. Philadelphia	4.55	4.55	4.55	4.55	4.55	4.55	4.90	4.90	4.90	4.90	4.90	4.90
Sheets, Hot-Rolled, Sparrows Point, Md.	4.05	4.05	4.05	4.05	4.05	4.05	4.325	4.325	4.325	4.325	4.325	4.325
Pig Iron, Basic, deld. Philadelphia	$59.66	$59.66	$59.66	$59.66	$59.66	$59.66	$60.04	$59.16	$59.16	$60.96	$62.16	$62.16
Pig Iron, No. 2 Foundry, deld. Philadelphia	55.16	55.16	55.16	55.16	55.16	56.66	58.72	59.66	59.66	61.46	62.66	62.66
Pig Iron, Standard Low Phos., deld. Philadelphia	67.55	67.55	67.55	67.55	67.55	67.55	69.43	70.05	70.05	70.05	70.05	70.05
Oven Foundry Coke, Kearny, N. J.	24.00	24.00	24.00	24.50	24.50	24.50	24.50	25.25	25.50	25.50	25.50	25.50
Scrap, No. 1 Heavy Melting Steel	33.75	38.00	38.75	37.69	35.90	37.31	40.88	46.00	46.50	46.50	47.50	50.00
Scrap, No. 1 Cupola Cast	35.00	35.80	38.00	37.75	37.20	36.00	36.00	37.25	39.38	41.60	45.13	50.50
Spiegeleisen 19-21%, Palmerton, Pa., furnace	86.00	86.00	86.00	86.00	86.00	86.00	86.00	86.00	86.00	87.20	88.00	88.00

COAL CHEMICALS	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.
Benzene, per gallon, producers' plants, tank lots	39.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00
Toluene, one degree, per gallon, producers' plants	33.50	33.50	33.50	33.50	33.50	33.50	33.50	33.50	33.50	33.30	33.00	33.00
Xylene, per gallon, producers' plants, tank lots	33.50	33.50	33.50	33.50	33.50	33.50	33.50	33.50	33.50	33.50	33.50	33.50
Phenol, Grade 5, per pound, producers' plants	14.25	14.25	14.25	14.25	14.25	14.25	14.25	14.25	14.25	15.25	15.25	15.25
Ammonium Sulphate, per ton, bulk, ovens	43.50	43.50	43.50	43.50	43.50	43.50	43.50	43.50	43.50	43.50	43.50	43.50

Nonferrous Prices

METALWORKING FACTS AND FIGURES

NONFERROUS METAL PRICES

(Cents per pound)

	1955												Yearly Averages		
	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.*	1955*	1954	1953
Copper Sheets[1]	48.76	51.16	51.76	54.76	54.76	54.76	54.76	56.86	62.76	62.76	62.90	62.90	56.58	48.41	48.83
Copper Rods[8]	46.36	46.90	49.36	52.36	52.36	52.36	52.36	54.46	60.36	60.36	60.36	60.36	54.00	46.01	46.01
Copper Tubing[1]	48.82	51.12	51.82	54.82	54.82	54.82	54.82	56.92	62.82	62.82	63.01	63.01	56.64	48.47	48.83
Yellow Brass Sheets[1]	42.27	43.87	44.27	46.27	46.27	46.27	46.27	47.87	52.27	52.27	52.27	52.27	47.70	41.77	42.01
Yellow Brass Rods[1].	33.50	35.36	35.36	37.22	37.22	37.22	37.22	38.64	42.41	42.41	42.41	42.41	38.45	38.08	37.81
Yellow Brass Tubing[1]	45.18	46.78	47.18	49.18	49.18	49.18	49.18	50.78	55.18	55.18	55.18	55.18	50.61	44.68	44.93
Nickel Silver Sheets[3]	56.30	57.47	58.25	60.20	60.20	60.20	60.20	61.54	66.00	66.00	66.00	66.00	61.53	55.75	55.28
Phosphor Bronze Sheets[4]	67.31	69.55	70.12	73.03	73.03	73.03	73.03	75.16	80.99	80.99	80.99	80.99	74.85	66.64	68.07
Zinc Sheets[1]	23.00	23.00	23.00	23.00	23.00	23.00	23.00	23.00	23.00	23.00	23.00	23.00	23.00	23.00	23.00
Bronze Sheets[2]	47.38	49.54	50.08	52.78	52.78	52.78	52.78	54.73	60.18	60.18	60.18	60.18	54.46	46.99	47.32
Bronze Rods[3]	47.32	49.48	50.02	52.72	52.72	52.72	52.72	54.67	60.12	60.12	60.12	60.12	54.40	46.93	47.09
Bronze Tubing[2]	49.94	52.10	52.64	55.34	55.34	55.34	55.34	57.29	62.74	62.74	62.74	62.74	57.02	49.55	49.90
Yellow Brass Wire[1]	42.81	44.41	44.81	46.81	46.81	46.81	46.81	48.41	52.81	52.81	52.81	52.81	48.24	42.31	42.38
Copper Magnet Wire[5]	41.83	44.99	46.05	48.73	48.38	48.15	48.15	49.73	55.52	55.52	55.52	55.52	49.84	41.83	42.01
Weatherproof Copper Wire[6]	36.53	38.78	39.45	41.44	41.19	41.03	41.03	45.16	46.28	46.28	46.28	46.28	42.48	36.53	36.60
Bare Copper Wire[6]	35.48	38.48	39.37	42.03	41.70	41.48	41.48	43.02	48.88	48.88	48.88	48.88	43.21	35.48	35.81
No. 115 Brass Ingot[7]	30.38	31.50	34.75	36.63	35.30	34.50	36.50	40.30	42.50	41.60	41.00	41.00	37.16	26.92	26.03
No. 305 Brass Ingot[7]	34.38	35.50	38.75	40.63	38.80	38.00	39.81	43.55	45.75	45.15	44.75	44.75	40.82	31.38	30.60
No. 405 Brass Ingot[7]	26.13	27.25	30.38	31.88	30.45	29.25	30.88	33.15	34.75	33.55	32.75	32.75	31.10	22.98	21.73

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* Estimated.

[1] F.o.b. mill. [2] 90% Cu; f.o.b. mill [3] 10% Ni; f.o.b. mill. [4] Grade A; f.o.b. mill. [5] Carlots; f.o.b. destination. [6] Carlots; f.o.b. eastern mill. [7] Delivered. [8] Cold-drawn; f.o.b. mill.

COPPER

Electrolytic; cents per lb, delivered
Connecticut Valley

	1955	1954	1953	Yearly Averages
Jan. ...	30.180	29.750	24.500	1955*.38.171
Feb. ...	33.000	29.750	25.136	1954..29.777
Mar. ...	33.222	29.865	30.510	1953..29.037
Apr. ...	36.000	29.955	30.755	1952..24.500
May ...	36.000	30.000	29.845	1951..24.500
June ...	36.000	30.000	29.875	1950..21.588
July ...	36.000	30.000	29.846	1949..19.499
Aug. ...	37.759	30.000	29.375	1948..22.317
Sept. ...	45.380	30.000	29.500	1947..21.215
Oct. ...	44.594	30.000	29.606	1946..14.043
Nov. ...	44.420	30.000	29.750	1945..12.000
Dec. ...	45.50*	30.000	29.750	1944..12.000

ZINC

Prime Western; cents per lb, East St. Louis

	1955	1954	1953	Yearly Averages
Jan. ...	11.500	9.760	12.596	1955*.12.303
Feb. ...	11.500	9.369	11.431	1954..10.721
Mar. ...	11.500	9.657	11.000	1953..10.851
Apr. ...	11.927	10.250	11.000	1952..16.213
May ...	12.000	10.290	11.000	1951..17.994
June ...	12.250	10.923	11.000	1950..13.879
July ...	12.500	11.000	11.000	1949..12.152
Aug. ...	12.500	11.000	11.000	1948..13.563
Sept. ...	12.940	11.900	10.180	1947..10.500
Oct. ...	13.020	11.500	10.000	1946...8.727
Nov. ...	13.000	11.500	10.000	1945...8.250
Dec. ...	13.000*	11.500	10.000	1944...8.250

CADMIUM

Regular shapes; dollars per lb, del.

	1955	1954	1953	1952	1951	1950
Jan. ..	1.70	2.00	1.94	2.55	2.55	2.00
Feb. ..	1.70	1.70	2.00	2.55	2.55	2.00
Mar. .	1.70	1.70	2.00	2.55	2.55	2.00
Apr. ..	1.70	1.70	2.00	2.55	2.55	2.00
May ..	1.70	1.70	2.00	2.40	2.55	2.00
June ..	1.70	1.70	2.00	2.25	2.55	2.11
July ..	1.70	1.70	2.00	2.20	2.55	2.15
Aug. .	1.70	1.70	2.00	2.00	2.55	2.15
Sept. .	1.70	1.70	2.00	2.00	2.55	2.34
Oct. ..	1.70	1.70	2.00	2.00	2.55	2.40
Nov. .	1.70	1.70	2.00	2.00	2.55	2.44
Dec. ..	1.70*	1.70	2.00	1.80	2.55	2.55
Avg. .	1.70*	1.72	1.99	2.24	2.55	2.18

ANTIMONY

Domestic, bulk, carlots; cents per lb,
f.o.b. Laredo, Tex.

	1955	1954	1953	Yearly Averages
Jan. ...	28.500	28.500	34.500	1955*.30.150
Feb. ...	28.500	28.500	34.500	1954..28.500
Mar. ...	28.500	28.500	34.500	1953..33.932
Apr. ...	28.500	28.500	34.500	1952..42.112
May ...	28.500	28.500	34.500	1951..42.335
June ...	28.500	28.500	34.500	1950..27.626
July ...	28.500	28.500	34.500	1949..36.875
Aug. ...	30.300	28.500	34.500	1948..35.010
Sept. ...	33.000	28.500	34.500	1947..31.922
Oct. ...	33.000	28.500	34.500	1946..15.972
Nov. ...	33.000	28.500	33.682	1945..14.500
Dec. ...	33.000*	28.500	28.500	1944..14.500

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* Estimated.

ALUMINUM

99% plus, ingots; cents per lb, f.o.b.
shipping point

	1955	1954	1953	Yearly Averages
Jan. ...	22.900	21.500	20.173	1955*.23.664
Feb. ...	23.200	21.500	20.500	1954..21.785
Mar. ...	23.200	21.500	20.500	1953..20.925
Apr. ...	23.200	21.500	20.500	1952..19.410
May ...	23.200	21.500	20.500	1951..19.000
June ...	23.200	21.500	20.500	1950..17.695
July ...	23.200	21.500	20.923	1949..17.000
Aug. ...	24.267	22.119	21.500	1948..15.764
Sept. ...	24.400	22.200	21.500	1947..15.000
Oct. ...	24.400	22.200	21.500	1946..15.000
Nov. ...	24.400	22.200	21.500	1945..15.000
Dec. ...	24.400*	22.200	21.500	1944..15.000

LEAD

Common grade; cents per lb, St. Louis

	1955	1954	1953	Yearly Averages
Jan. ...	14.800	13.060	13.838	1955*.14.935
Feb. ...	14.800	12.610	13.300	1954..13.854
Mar. ...	14.800	12.735	13.300	1953..13.283
Apr. ...	14.800	13.710	12.473	1952..16.268
May ...	14.800	13.800	12.550	1951..17.294
June ...	14.800	13.906	13.213	1950..13.095
July ...	14.800	13.800	13.483	1949..15.191
Aug. ...	14.800	13.846	13.800	1948..17.867
Sept. ...	14.920	14.400	13.540	1947..14.504
Oct. ...	15.300	14.775	13.300	1946...7.957
Nov. ...	15.300	14.800	13.300	1945...6.350
Dec. ...	15.300*	14.800	13.300	1944...6.350

COBALT

97-98%; dollars per lb for 500 lb keg

	1955	1954	1953	1952	1951	1950
Jan.	2.60	2.60	2.40	2.40	2.10	1.80
Feb.	2.60	2.60	2.40	2.40	2.10	1.80
Mar.	2.60	2.60	2.40	2.40	2.10	1.80
Apr.	2.60	2.60	2.40	2.40	2.10	1.80
May	2.60	2.60	2.40	2.40	2.10	1.80
June	2.60	2.60	2.40	2.40	2.10	1.80
July	2.60	2.60	2.40	2.40	2.10	1.80
Aug.	2.60	2.60	2.40	2.40	2.10	1.80
Sept.	2.60	2.60	2.40	2.40	2.10	1.80
Oct.	2.60	2.60	2.40	2.40	2.40	1.80
Nov.	2.60	2.60	2.60	2.40	2.40	1.80
Dec.	2.60	2.60	2.60	2.40	2.40	2.03
Avg.	2.60*	2.60	2.43	2.40	2.18	1.82

SILVER

Open market, cents per fine oz., New York

	1955	1954	1953	Yearly Averages
Jan. ...	85.250	85.250	84.442	1955*.89.062
Feb. ...	85.250	85.250	85.250	1954..85.250
Mar. ...	86.880	85.250	85.250	1953†.85.188
Apr. ...	87.000	85.250	85.250	1952†.84.941
May ...	88.882	85.250	85.250	1951†.89.368
June ...	89.688	85.250	85.250	1950†.74.165
July ...	90.438	85.250	85.250	1949†.71.930
Aug. ...	90.750	85.250	85.250	1948†.74.361
Sept. ...	90.795	85.250	85.250	1947†.71.820
Oct. ...	91.800	85.250	85.250	1946†.80.151
Nov. ...	91.500	85.250	85.250	1945†.51.928
Dec. ...	90.510*	85.250	85.250	1944†.44.750

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*Estimated.

†As reported by Handy & Harman, New York.

NICKEL

Electrolytic cathodes, 99.5%, base sizes,
unpacked, cents per lb, f.o.b. refinery

	1955	1954	1953	Yearly Averages
Jan. ...	64.500	60.000	58.654	1955*.64.500
Feb. ...	64.500	60.000	60.000	1954..60.450
Mar. ...	64.500	60.000	60.000	1953..59.888
Apr. ...	64.500	60.000	60.000	1952..56.500
May ...	64.500	60.000	60.000	1951..54.000
June ...	64.500	60.000	60.000	1950..44.809
July ...	64.500	60.000	60.000	1949..40.000
Aug. ...	64.500	60.000	60.000	1948..36.528
Sept. ...	64.500	60.000	60.000	1947..35.000
Oct. ...	64.500	60.000	60.000	1946..31.850
Nov. ...	64.500	60.900	60.000	1945..35.000
Dec. ...	64.500*	64.500	60.000	1944..35.000

TIN

Straits, spot; cents per lb, New York

	1955	1954	1953	Yearly Averages
Jan. ...	87.280	85.100	121.500	1955*.94.507
Feb. ...	90.908	85.181	121.500	1954..91.936
Mar. ...	91.176	92.518	121.500	1953..95.925
Apr. ...	91.458	96.260	102.567	1952.120.492
May ...	91.410	93.600	97.240	1951.127.072
June ...	93.668	94.178	92.918	1950..95.552
July ...	97.045	96.558	81.577	1949..99.996
Aug. ...	96.519	93.332	80.530	1948..99.250
Sept. ...	96.565	93.545	82.410	1947..77.975
Oct. ...	96.230	93.110	81.096	1946..54.563
Nov. ...	97.825	91.196	83.352	1945..52.000
Dec. ...	104.00*	88.649	84.913	1944..52.000

IRIDIUM

Dollars per troy ounce

	1955	1954	1953	1952	1951
Jan. ..	115.00	170.00	180.00	200.00	200.00
Feb. ..	121.50	170.00	180.00	200.00	200.00
Mar. ..	105.00	156.50	180.00	200.00	200.00
Apr. ..	105.00	147.50	177.50	200.00	200.00
May ..	103.00	147.50	170.00	200.00	200.00
June ..	95.00	147.50	170.00	200.00	200.00
July ..	95.00	147.50	170.00	200.00	200.00
Aug. ..	97.00	147.50	170.00	200.00	200.00
Sept. ..	100.00	147.50	170.00	200.00	200.00
Oct. ..	102.00	147.50	170.00	200.00	200.00
Nov. ..	110.00	147.50	170.00	185.00	200.00
Dec. ..	110.00*	123.12	170.00	180.00	200.00
Avg. ..	104.88*	149.97	173.13	197.08	200.00

PLATINUM

Dollars per ounce

	1955	1954	1953	1952	1951	1950
Jan.	82.13	92.00	91.50	91.50	91.50	69.90
Feb.	81.00	92.00	91.50	91.50	91.50	67.50
Mar.	78.00	87.90	91.50	91.50	91.50	67.50
Apr.	78.00	85.50	91.50	91.50	91.50	67.50
May	77.90	85.50	91.50	100.50	91.50	67.50
June	78.13	85.50	91.50	94.50	91.50	67.50
July	81.38	85.50	93.00	91.50	91.50	73.50
Aug.	83.50	83.50	92.00	91.50	91.50	78.10
Sept.	90.63	85.50	92.00	91.50	91.50	98.25
Oct.	94.30	85.50	92.00	91.50	91.50	97.50
Nov.	102.75	85.50	92.00	91.50	91.50	91.50
Dec.	104.50	101.00	92.00	91.50	91.50	91.50
Avg.	86.02	86.60	91.83	92.50	91.50	78.15

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*Estimated.

Nonferrous Metals

COPPER PRODUCTION, SHIPMENTS AND STOCKS

DOMESTIC STATISTICS—Net Tons

Period	PRODUCTION Primary	PRODUCTION Secondary	PRODUCTION Refined	Deliveries To Customers	Refined Stocks End of Period
1955					
10 mos...	849,923	105,547	1,188,314	1,159,260	49,738
Jan.	86,931	8,879	123,840	113,949(b)	45,982
Feb.	89,078	13,264	123,162	108,503(b)	44,579
Mar.	98,171	10,239	135,701	131,354(b)	46,091
Apr.	93,669	10,559	122,129	119,863(b)	42,759
May	95,042	11,731	135,042	124,853(b)	43,340
June	90,645	11,295	130,881	132,730(b)	38,533
July	31,846	7,614	51,182	60,143(b)	36,293
Aug.	67,990	9,364	98,732	89,348(b)	49,350
Sept. ...	96,343	12,739	139,880	144,571	53,625
Oct.	100,208	9,863	127,765	133,946	49,738
1954	863,721	102,472	1,311,031	1,208,755(b)	47,108
1953	957,318	110,475	1,395,003	1,443,719(b)	89,193(a)
1952	961,886	46,003	1,189,112	1,445,834(b)	58,858(a)
1951	964,589	56,910	1,199,784	1,367,787	71,528
1950	940,249	117,439	1,270,768	1,371,464	49,040
1949	772,986	135,052	1,056,463	1,031,595	116,027
1948	850,088	130,410	1,233,697	1,344,445	96,080
1947	871,391	105,307	1,196,393	1,383,666	76,035
1946	618,757	32,503	604,071	1,261,830	80,832
1945	792,126	49,541	843,113	1,517,842	76,512

FOREIGN STATISTICS—Net Tons

Period	PRODUCTION Primary	PRODUCTION Secondary	PRODUCTION Refined	Deliveries To Customers	Refined Stocks End of Period
1955					
10 mos...	1,320,457	6,085	1,049,683	1,090,446	177,523
Jan. ...	109,582	350	85,743	113,035	159,296
Feb. ...	114,260	208	89,661	116,752	144,337
Mar. ...	133,530	319	101,825	103,764	148,973
Apr. ...	137,567	283	102,396	101,552	158,076
May ...	134,732	574	116,749	108,924	176,620
June ...	141,413	603	109,659	115,719	171,412
July ...	135,900	765	108,317	89,500	183,350
Aug. ...	127,405	774	110,242	110,701	180,672
Sept. ...	140,606	1,049	108,601	117,547	174,377
Oct. ...	145,462	1,160	116,490	112,952	177,523
1954	1,494,386	5,273	1,155,516	1,247,120	181,529
1953	1,441,874	13,238	1,120,066	831,441	280,530
1952	1,401,001	9,582	1,196,426	1,005,259	130,103
1951	1,378,833	5,360	1,225,018	1,013,450	152,203

Total Domestic and Foreign

Period	PRODUCTION Primary	PRODUCTION Secondary	PRODUCTION Refined	Deliveries To Customers	Refined Stocks End of Period
1955					
10 mos...	2,170,380	111,632	2,237,997	2,249,706	227,261
1954	2,358,107	107,745	2,466,547	2,455,875	228,637
1953	2,399,192	123,713	2,515,069	2,275,160	369,723
1952	2,362,887	55,585	2,385,538	2,451,093	188,961
1951	2,343,422	62,270	2,424,802	2,381,237	223,731

Copper Institute. Includes tonnage delivered: (a) to U. S. consumers at foreign ports; (b) from government stocks.

Imports of Copper

Unrefined, Scrap, Refined—Net Tons

	1955	1954	1953	1952	1951	1950
Jan.	39,307	34,790	50,055	49,580	45,886	56,213
Feb.	45,858	55,868	62.345	41,941	44,872	61,378
Mar.	44,619	43,384	52,387	48,272	36,600	45,207
Apr.	44,041	45,975	70,191	42,970	43,812	34,520
May	45,339	51,989	67,662	37,172	46,771	66,117
June	49,369	81,833	80,943	33,061	50,544	87,293
July	46,815	62,228	66,200	66,380	46,606	28,681
Aug.	53,010	55,391	48,305	61,122	58,969	33,576
Sept.	60,357	54,436	57,379	67,817	46,566	36,298
Oct.	.....	30,805	50,810	59,910	42,943	62,645
Nov.	.....	43,540	32,226	59,230	39,714	39,172
Dec.	.....	46,755	32,105	70,300	36,021	54,807
Monthly Avg.	.....	50,583	55,884	53,146	44.942	50,492

U. S. Bureau of the Census.

Exports of Copper

Refined and Manufactured—Net Tons

	1955	1954	1953	1952	1951	1950
Jan.	26,874	30,472	8,079	10,598	8,729	12,165
Feb.	37,347	25.499	6,030	12,842	16,027	20,748
Mar.	25,502	19,043	8,645	15,303	14,457	19,021
Apr.	28,531	31,235	6.551	19,494	17,652	17,120
May	28,753	29,712	8,669	20.252	14,041	14,064
June	19,322	26,046	7,278	18,347	13,162	11,434
July	13,790	24,183	13,317	15,435	13,535	9,785
Aug.	12,136	27,121	18,064	14,604	6,714	12,230
Sept.	20,411	16,783	18,249	20,945	4,971	12,035
Oct.	.....	25,867	18.870	18,226	9,864	11,925
Nov.	.....	18,883	15.898	13,016	16,488	12.226
Dec.	.....	23,562	20.416	16,257	16,599	20,905
Monthly Avg.	.....	24.866	12.506	16.277	12.687	14.472

U. S. Bureau of the Census.

Brass Ingot Shipments

Net Tons

	1955	1954	1953	1952
Jan.	25,201	20,661	24,423	28,315
Feb.	25,349	19,920	25,429	24,211
Mar.	29,713	23,653	28,256	23,890
Apr.	27,641	24,746	25,044	22,547
May	23,708	22,269	21,660	21,740
June	23,141	22,348	20,818	21,274
July	18,513	17,074	19,321	18,947
Aug.	27,013	21,684	20,156	21,807
Sept.	26,349	22,464	21,463	22,770
Oct.	.....	24,080	22,280	25,811
Nov.	.....	23,061	21,860	23,441
Dec.	.....	21,273	20,541	22,983
Total	.....	263,233	271,251	277,736

Compiled by Ingot Brass & Bronze Industry, representing in excess of 95 per cent of brass and bronze industry.

Copper Consumption in U.S.

Refined Metal—Net Tons

	1954	1953	1952
Brass Mills	545,645	689,477	675,073
Wire Mills	668,601	753,029	739,488
Chemical Plants .	2,329	3,849	3,719
Secondary Smelters	7,434	15,305	22,918
Foundries & Misc.	30,720	32,555	38,535
Total	1,254,729	1,494,215	1,479,732

U. S. Bureau of Mines.

Copper and Brass Mill Fabricator Statistics

(Summary of statistics which cover United States duty-free and duty-paid foreign copper until January. 1947; copper from all sources, duty free, thereafter. Figures given in net tons.)

	DELIVERIES		STOCKS AT END OF PERIOD					
	Deliveries to Users (actual consump.)	Producer Deliveries to Fabricators	Fabricators' Refined Stocks	Less Working Stocks	Visible Supplies	Plus Undelivered Purchases	Total Stocks and Purchases	Unfilled Orders
1955								
10 mos. ..	1,162.419	1,159.372	353.469	313.048	40.421	135 075	175 500	275.255
Jan.	136.539	113.949	334.105	302,658	31.447	66.122	97.569	159.016
Feb.	118.786	108,503	323,425	301.597	21.828	75.890	96 718	179.948
Mar.	143.544	131.354	311.235	301,937	9.298	85.859	95.157	187,827
Apr.	115.073	119.863	316.575	304.117	12.458	88,992	101.450	205 308
May	113.485	124,853	327.343	309.219	18.124	111.715	129.839	232.279
June	132.377	132,842	327,696	309,972	17.724	126.703	144.427	234,578
July	75,846	60,143	312,587	301.048	11.539	165.505	177.044	286.095
Aug.	97.688	89.348	304,097	303.089	1.008	150.854	151.862	283.653
Sept.	113.628	144,571	334,996	314,111	20.885	133 391	154.276	270,102
Oct.	115.453	133,946	353,469	313.048	40.421	135.075	175.500	275.255
1954	1,232.058	1,208,755	360.526	304.619	55.907	58.125	114.032	136 581
Jan.	100,805	77,091	355,622	307,014	48.608	26.423	75.031	142,588
Feb.	94,975	89,017	349.661	305.670	43.991	26.227	70.218	122.999
Mar.	103,796	95.795	341,693	304,065	37,628	28.836	66.464	123.887
Apr.	104,693	104,579	341.616	302,391	39.225	30.677	69,902	124,559
May	102,810	111,005	349.796	305,504	44.292	33,210	77.502	123,039
June	104,631	106,252	351.518	304.833	46.565	43,723	90.288	122,218
July	80.751	97.436	370.287	307.352	62.935	41,104	104.039	130.576
Aug.	102,966	92,475	359,474	302,423	57,051	58,007	115.058	131,514
Sept.	106,628	89,198	341,726	300.603	41,123	50.650	91.773	148,515
Oct.	116,232	105,293	330,787	299,068	31,719	50,240	81,959	135,140
Nov.	114,392	118,707	335,315	301,097	34,218	55,517	89,735	137,076
Dec.	99,479	121,907	360,526	304,619	55,907	58,125	114.032	136,581
1953	1,375,869	1,443,710	380,881	309,664	71,217	25.022	96,239	170,917
1952	1,391,477	1,445,834	331,499	292,157	39,342	32,652	71,994	275,608
1951	1,394,960	1,367,787	280,402	295,385	—14,983	32,147	17,164	303,050
1950	1,438.237	1,371,464	290,241	288,392	1.849	92,372	94,221	313,052
1949	1,053,225	1,031,595	354,992	285,298	69.694	82,793	152,487	189,407
1948	1,394,307	1,344,445	379,346	295,958	83.388	81,496	164,884	315,944
1947	1,338,383	1,383,666	423,432	293,859	129.573	103,765	233.338	338,260
1946	1,231,225	1,260,921	411,013	286,418	124.595	59,421	184,016	526,648
1945	1,462,440	1,517,842	375,618	268,490	107,128	44,100	151,228	362,436
1944	1,656,052	1,636,295	334,017	289,160	44.857	53.538	98.395	285.654
1943	1,701,753	1,643,955	353,948	299,796	54,152	90,807	144,959	465,258

Copper Institute.

Nonferrous Metals

METALWORKING FACTS AND FIGURES

Slab Zinc

Net Tons

Commencing with January, 1948, all regularly operating United States primary and secondary smelters are included. Production from foreign ores is included commencing with 1940.

	Stock Beginning	Production	SHIPMENTS Domestic	SHIPMENTS Export & Drawback	SHIPMENTS Gov't. Acc't.	SHIPMENTS Total	Unfilled Orders at End
1955* ...	124,277	1,028,000	1,000,000	18,500	87,500	1,106,000	65,000
Jan. ..	124,277	86,076	70,863	2,644	19,694	93,201	57,421
Feb. ..	117,152	78,977	80,016	3,743	16,205	99,964	54,527
Mar. ..	96,165	89,179	79,720	1,828	12,959	94,507	60,057
Apr. ..	90,837	83,786	89,589	1,967	8,488	100,044	65,127
May ..	74,579	86,177	83,336	3,802	10,434	97,572	70,084
June ..	63,184	84,458	92,212	1,492	5,335	99,039	57,231
July ..	48,603	84,400	76,812	862	4,039	81,713	64,056
Aug. ..	51,290	84,874	87,042	885	2,153	90,080	73,632
Sept. ..	46,084	83,448	83,664	1,274	2,427	87,365	52,278
Oct. ..	42,167	89,449	85,770	36	1,942	87,748	61,746
Nov. ..	43,868	86,813	90,819	280	1,561	92,660	64,560
1954	180,843	868,242	787,922	27,929	108,957	924,808	45,862
1953	87,160	971,191	818,850	16,326	42,332	877,508	35,466
1952	21,901	961,430	803,343	56,202	36,626	896,171	45,264
1951	8,884	931,833	836,800	42,067	39,949	918,816	50,909
1950	94,221	910,363	849,255	18,189	128,256	995,700	74,795
1949	20,848	870,113	648,285	56,929	91,526	796,740	42,625
1948	68,647	850,105	770,396	69,910	57,598	897,904	51,318
1947	175,800	848,027	698,281	117,305	140,230	955,816	59,705
1946	259.391	759,346	714,292	66,638	62,007	842,937	58,057
1945	237,520	799,520	762,925	9,422	5,302	777,649	27,092
1944	173 510	901,332	830,334	6,988	......	837,322	21,332
1943	89.275	971,873	831,430	56,208	......	887,638	44,914
1942	24,066	929,770	733,918	151,650	......	885,568	52,752
1941	17.582	863,955	751,276	106,195	......	857,471	87,666
1940	74,262	706,100	674,615	88,165	......	762,780	125,132
1939	126,769	538,198	598,972	......	......	598,972	53,751
1938	65,333	456,990	395.534	20	......	395,554	40,829
1937	44.955	589,619	569,241	......	......	569,241	48.339
1936	83,758	523,166	561,969	......	......	561,969	78,626
1935	118,005	431,499	465,687	59	......	465,746	51,186
1934	105,560	366,933	352.515	148	......	352,663	30,786

American Zinc Institute Inc.

*Estimated.

U. S. Lead

Refiners' Stocks, Production, Shipments

Net Tons

	Stock at Beginning	Production (Inc. Secondary)	Total Supply	Domestic Shipments
1955*	92,719	541,000	633,719	530,000
Jan.	92,719	44,780	137,499	40,451
Feb.	84,882	40,173	125,055	46,645
Mar.	64,938	50,308	115,246	42,381
Apr.	59,881	50,274	110,155	44,878
May	54,956	45,435	100,391	46,130
June	50,947	48,150	99,097	44,985
July	44,665	23,850	68,515	26,547
Aug.	39,856	36,912	76,768	41,469
Sept.	34,111	50,453	84,564	46,250
Oct.	30,753	53,747	84,500	52,062
1954	81,152	551,618	632,770	475,552
1953	43,560	533,883	577,443	488,437
1952	25,339	532,778	558,117	492,094
1951	35,619	486,874	522,493	496,184
1950	70,424	571,763	642,187	499,637
1949	38,644	542,676	581,320	355,905
1948	21,328	511,356	532,684	490,630
1947	47,587	541,065	588,652	566,666
1946	44,867	396,688	441,555	393,904
1945	19,536	524,328	543,864	500,003
1944	33,090	538,618	571,708	552,063
1943	34,937	546,673	581,610	548,417
1942	20,185	633,818	654,003	618,947
1941	40,926	634,888	675,814	655,542
1940	58,777	685,480	644,257	603,143
1939	115,902	497,991	613,893	555,074
1938	129,131	408,539	537.570	421,625
1937	171,856	533.215	705.071	575,933
1936	222,306	463.006	685,312	513,361
1935	234,030	421,764	655,794	433,456
1934	203,061	412,298	615,359	379,807
1933	176,157	374,153	550.310	347,156

American Bureau of Metal Statistics.

*Estimated.

Mine Production of Zinc

Net Tons

	1955	1954	1953	1952	1951
Jan. ..	41,205	39.637	53,002	59,323	59,651
Feb. ..	39,389	39,398	49,356	58,948	56 878
Mar. ..	45,216	42,248	51,680	60,904	60,670
Apr. ..	42,886	39.915	51,103	61,211	56,467
May ..	44,273	40.008	47.790	62,663	58,233
June ..	43,477	40,391	46,365	57,068	56,473
July ..	41,817	38,445	42,305	50,642	53,379
Aug. ..	42,323	38.141	40.965	49.482	54,403
Sept. ..	41,242	34.178	39.188	48,748	50,089
Oct. ..	.....	35,511	38,771	53,346	60,004
Nov. ..	.....	38,338	36,460	48,899	57,195
Dec. ..	.....	39,035	37,745	49,789	57,269
Mo. Avg.	.....	38,770	44.561	55.085	55.960

U. S. Bureau of Mines.

Mine Production of Lead

Net Tons

	1955	1954	1953	1952	1951
Jan. ..	27,347	24,946	30,633	34,299	35,481
Feb. ..	27,004	27.624	29,427	34,339	33,870
Mar. ..	30,961	29.531	31,347	33,432	37,096
Apr. ..	28,602	26.900	31,052	34,496	33,587
May ..	28.807	25,404	29,045	33,824	34,005
June ..	28.442	26,253	28,349	31,002	32,681
July ..	25,846	25,364	26,364	29,862	30,491
Aug. ..	26 666	27,066	26.083	30,232	29,872
Sept. ..	26,677	25,001	26.474	30.386	27,653
Oct. ..	.....	25,755	26,652	33.523	33,133
Nov. ..	.....	26,911	24,671	29,160	33,326
Dec. ..	.....	28,230	27,107	29,542	33,499
Mo. Avg.	.....	26,499	28,100	32.513	32.347

U. S. Bureau of Mines.

Titanium

Domestic Production—Net Tons

	Sponge		Mill Products
1955*.......	7.500	1955*.......	2,000
1954........	5,300	1954........	1,250
1953........	2,241	1953........	1,150
1952........	1,075	1952........	250
1951........	495	1951........	75
1950........	75	1950........	55
1949........	25	1949........	....
1948........	2.5	1948........	....

*Estimated.

CONSUMPTION OF SLAB ZINC IN U.S.

Net Tons

	Galvanizing	Brass & Bronze Products	Rolled Zinc	Zinc-Base Alloys	Miscellaneous	Total
1955						
Jan.	32,638	12,313	3,754	32,863	3,551	85,119
Feb.	31,601	10,690	3,912	31,254	3,145	80,602
Mar.	37,648	12,718	4,635	37,682	3,705	96,388
Apr.	36,136	11,034	3,833	36,628	3,681	91,312
May	37,471	12,404	4,203	36,926	3,909	94,913
June	37,874	13,305	5,012	32,821	3,727	92,739
July	33,433	7,017	2,832	23,910	3,397	70,589
Aug.	38,317	10,244	5,431	30,168	3,527	87,687
Sept.	39,181	12,672	4,185	31,804	4,007	91,849
1954	398,599	107,293	45,979	286,817	37,442	876,130
1953	377,688	155,608	51,318	236,689	31,480	852,783
1952	375,563	155,311	51,508	236,022	30,885	849,289
1951	400,279	143,292	64,085	296,434	29,881	933,971

CONSUMPTION OF LEAD IN U.S.—1954-1955

Net Tons

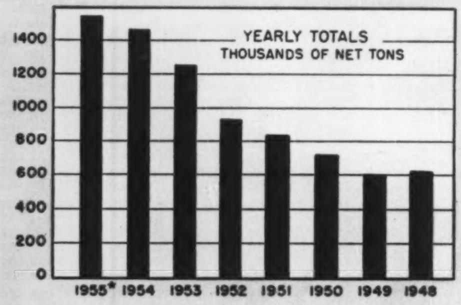
Metal Products	Total 1954	1955 Jan.	1955 Feb.	1955 Mar.	1955 Apr.	1955 May	1955 June	1955 July
Ammunition	40,206	3,638	3,845	4,263	3,532	3,444	4,005	3,139
Bearing Metals	27,166	2,604	2,069	2,884	2,724	2,345	2,577	2,119
Brass & Bronze	20.147	1,704	1,761	2,055	1,909	1,880	2,088	1,382
Cable Covering	127,939	10,055	9,413	11,261	9,475	9,462	10,309	5,105
Calking Lead	49,854	3,916	4,587	4,933	5,106	4,911	5,660	4,951
Casting Metals	10,969	1,123	1,042	1,139	969	1,244	1,353	1,101
Collapsible Tubes	10,736	908	740	806	741	639	877	453
Foil	4,448	211	449	437	349	378	406	431
Pipe, Traps & Bends	26,832	2,189	2,324	2,712	2,307	2,705	2,549	2,197
Sheet Lead	26,104	2,348	2,262	2,611	2,861	2,770	2,460	2,118
Solder	71,122	6,550	6,871	8,092	7,343	7,677	7,740	6,877
Storage Batteries:								
Antimonial Lead	174.447	13,192	12,944	14,595	14,904	15,610	15,245	14,133
Oxides	162.825	13,072	11,953	13,141	14,351	14,927	14,733	13,295
Terne Metal	1,286	105	154	202	236	224	205	246
Type Metal	25,665	1,757	1,968	2,194	2,331	1,953	2,235	1,972
Total Metal Products	779,656	63,372	62,382	71,325	69,138	70,169	72,442	59,519
Pigments	116,409	9,373	8,759	11,020	10,824	11,911	12,882	9,604
Chemicals	167,184	16,486	10,830	12,985	12,263	14,613	13,175	12,292
Miscellaneous Uses	31,622	2,481	2,733	2,760	2,891	2,751	3,377	1,401
Total Consumed	1.094,871	91,712	84.704	98,090	95,116	99,444	101,876	83,800

U. S. Bureau of Mines.

Nonferrous Metals

METALWORKING FACTS AND FIGURES

PRIMARY ALUMINUM PRODUCTION



1949-1955 By Months—Net Tons

	1955	1954	1953	1952	1951	1950	1949
Jan.	128,203	116,247	89,895	76,934	67,954	52,023	53,356
Feb.	116,236	110,483	92,649	72,374	62,740	50,443	49,749
Mar.	130,272	122,339	104,460	77,069	70,022	58,747	54,852
Apr.	126,394	120,434	102,071	76,880	67,701	58,024	54,076
May	131,128	125,138	105,477	80,803	67,721	61,929	56,909
June	127,634	120,758	104,152	77,476	67,453	60,400	54,184
July	132,669	126,162	109,285	78,368	72,698	63,518	55,777
Aug.	133,551	125,296	110,545	85,175	73,815	63,006	52,001
Sept.	130,606	120,332	109,333	76,882	69,429	59,449	49,742
Oct.	134,656	125,089	108,219	77,312	72,647	62,915	45,790
Nov.	......	121,252	105,637	74,639	72,274	62,276	35,865
Dec.	......	127,056	110,291	83,409	72,454	65,897	41,161
Total ...	1,550,000*	1,460,586	1,252,014	937,321	836,908	718,627	603,462

Yearly totals reflect adjustments and in some instances vary slightly from the sums of monthly figures. *Estimated. U. S. Bureau of Mines.

Secondary Aluminum Production

Net Tons

	From New Scrap	From Old Scrap	Total	As Metal	As Alloys†
1954.........	232,052	59,989	292,041	4,185	286,289
1953.........	289,626	78,940	368,566	5,203	363,363
1952.........	233.258	71,264	304,522	4,897	299,625
1951.........	216,017	76.591	292,608	5,341	287,267
1950.........	167,308	76,358	243.666	2,140	241,526
1949.........	136.166	44,596	180.762	343	180,419
1948.........	191,129	95,648	286,777	2,384	284,393
1947.........	180,990	163,847	344,837	5,105	339,732
1946.........	187.538	90.535	278,073	2,075	275,998
1945.........	271.076	27,311	298,387	2,145	296,242
1944.........	302,746	22,899	325.645	2,336	323,309

†Also includes chemical compounds.
U. S. Bureau of Mines.

Bauxite Production and Imports

Long Tons—Quarterly figures are preliminary and their sums differ slightly from final annual totals.

	—Mine Production (dried equiv.)—			Imports as Shipped	Total New Supply
	Arkansas	Ala., Ga., Va.	Total		
1955					
1st Qtr.	475.280	18,888	494.168	1,212,548	1,706.716
2nd Qtr.	465.157	16.414	481.571	1,217,442	1.699.013
1954	1,955.204	50.723	2,005.927	5.291.862	7,297,789
1st Qtr.	391.305	10.752	402.057	1,350.225	1,752.282
2nd Qtr.	357,216	13,292	370.508	1,319,493	1,690.001
3rd Qtr.	675.137	13.944	689.081	1,303.563	1,992,644
4th Qtr.	531.546	12.735	544.281	1,318,581	1,862.862
1953	1,529.976	49,763	1,579.739	4,388,623	5,968.362
1st Qtr.	364.340	14.466	378.806	908,305	1,287.111
2nd Qtr.	396.134	14.936	411.070	1.106,243	1,517.313
3rd Qtr.	375.742	11,312	387.054	1,199.205	1.586.259
4th Qtr.	393.760	9.049	402.809	1,174.870	1,577.679
1952	1,603.883	63.214	1.667.047	3.497,939	5.164.986
1951	1,815.274	33.402	1.848.676	2.819.676	4.668.352
1950	1.307.335	27.192	1.334.527	2.516,247	3.850,774
1949	1,094.924	53.868	1,148,792	2,688,164	3.836.956
1948	1,395.341	61.807	1.457.148	2.488.915	3.946.063
1947	1,153.563	48.492	1,202.055	1,821.580	3,023,635
1946	1,019.118	53.707	1,072.825	852.005	1.924.830
1945	910.049	70.960	981.009	739.581	1,720,590
1944	2,695,317	128,407	2,823,724	560,461	3.384.185

U. S. Bureau of Mines.

Magnesium Wrought Products

Shipments—Thousands of Pounds

	1955	1954	1953	1952	1951	1950
Jan.	1,776	972	1.313	1,646	1.522	952
Feb.	1,648	1.058	1.454	1,759	1.489	761
Mar.	1,947	1,136	1.601	1,723	1,889	868
Apr.	1.756	892	1.708	1.756	1.531	998
May	1.836	1.129	1,699	1,786	1,716	850
June	1,686	1.312	1.192	1,427	1.643	1,198
July	1,437	1.032	1.589	1,390	1,391	1,177
Aug.	1,742	1,111	1,433	1,438	1,497	1.103
Sept.	2,158	1,183	1,254	1,299	1,461	1.011
Oct.	1,666	1,002	1,409	1.408	1,773	1.269
Nov.	....	1,243	1,314	1,177	1,645	1.305
Dec.	....	1,673	919	1,440	1,533	1,318
Total	....	13,743	16,885	18.249	19,090	12,810

U. S. Bureau of Mines.

Aluminum Wrought Products

Producers' Shipments, Thousands of Pounds

Period	Total	Plate, Sheet, and Strip	Rolled Structural Shapes, Rod, Bar, Wire	Extruded Shapes, Tube Blooms, and Tubing	Powder, Flake, and Paste
1955*	2,794.000	1,650.000	282.000	825.000	37.000
Jan.	206,175	114.040	28,193	60.477	3,465
Feb.	145,335	80,505	29,577	31,589	3,664
Mar.	234.730	138.394	21.089	71.981	3.266
Apr.	227.939	133,794	19,334	72,017	2,794
May	234,309	134,775	21,380	75,341	2,813
June	255.701	147,859	23.867	80.940	3,035
July	210.222	122,096	18,279	67,468	2,379
Aug.	250.036	149.709	24,104	73,184	3,039
1954	2,086.562	1,165,076	361.281	513.300	46,905
Jan.	153.920	84,293	31,600	34,576	3,451
Feb.	145.335	80,505	29,577	31,589	3,664
Mar.	170,010	92,955	32.698	38,928	5,429
Apr.	174,176	96,873	33.637	39.246	4.420
May	168,678	94,886	29,197	41,081	3,514
June	184,205	102.026	31.299	46.146	4,734
July	169.917	94,656	28,732	42.686	3,843
Aug.	183.063	104.580	29.849	44.300	4,334
Sept.	179.664	101.075	30.904	44.001	3,684
Oct.	180,356	100,793	26,954	48.878	3,731
Nov.	181,643	103.778	26.465	48.304	3,096
Dec.	195.595	108.656	30.369	53.565	3,005
1953	2.228.215	1,298.332	423.063	462.397	44.423
1952	1.924.750	1,085,699	443.546	347.542	47.963
1951	1,756,244	1,073,367	345,163	312,944	24,770

U. S. Bureau of the Census. *Estimated

Antimony Imports

Metal imported for consumption in United States—Net Tons

	—Antimony Ore—				Type Metal	
Year	Gross Weight	Sb Content	Needle or Liquidated Sb	Antimony Metal	& Antimonial Lead†	Antimony Oxide
1954...	12,870	4,722	6	2.802	4,088	1,476
1953...	17.242	7,778	17	2,612	1,350	1,296
1952...	18.246	7,945	34	3,354	1,494	1.766
1951...	26.698	11,746	6	2,231	465	2,039
1950...	22.307	9,746	19	4,632	1,936	1,160
1949...	17,855	7,473	81	1,853	654	56

U. S. Department of Commerce. †Estimated Sb content.

Antimony Production

Domestic mine production of ores and concentrates, Net Tons

		—Antimony Content—	
Year	Gross Weight	Quantity	Average Per Cent
1954	4,685	766	16.4
1953	2,161	372	17.2
1952	4,854	2,160	44.5
1951	9,401	3,472	37.0
1950	6,888	2,497	36.3
1949	5,260	1,636	40.0

U. S. Bureau of Mines.

Antimony Consumption

Industrial use of primary antimony—Net Tons

PRODUCTS	1954	1953	1952	1951
Ammunition	5	3	3	4
Antimonial Lead & Battery Metal	3,114	5,300	4,449	5,056
Bearing Metal and Bearings	816	1,000	1,119	1,308
Cable Covering ...	156	60	43	95
Castings	70	80	80	79
Collapsible Tubes and Foil	47	60	32	18
Sheet and Pipe ...	238	170	70	180
Solder	148	200	145	123
Type Metal	613	700	624	709
Other Metal	118	127	61	52
Nonmetal products	6,855	6,600	8,362	9,746
Total	12,180	14,300	14,988	17,370

U. S. Bureau of Mines.

Nonferrous Metals

METALWORKING FACTS AND FIGURES

U. S. Tin Imports

Ore (tin content) and Metal (bars, blocks, pigs, etc.) in Long Tons

	Ore	Metal
1955		
Jan.	1,857	4,143
Feb.	1.312	6.385
Mar.	1,769	6,026
Apr.	2,437	3,918
May	1,861	5,454
June	1,163	5,615
July	2,116	5,449
Aug.	2,180	5,520
1954		
Jan.	2,781	6,176
Feb.	2,417	3,987
Mar.	1,346	5,383
Apr.	1,217	5,021
May	16	5,828
June	3,100	6,859
July	414	3,924
Aug.	2,562	5,487
Sept.	2,286	4,512
Oct.	1,813	6,151
Nov.	2,169	6,466
Dec.	2.019	5,598
MONTHLY AVERAGES		
1954	1,845	5,553
1953	2,998	6,211
1952	2,208	6,704
1951	2,469	2,315
1950	2,169	6,910
1949	3,193	5,019
1948	3,124	4,060
1947	2,364	2,075
1946	3,178	1,293
1945	2,790	703

International Tin Study Group.

U. S. Silver Output

(Thousands of ounces; commercial bars, 0.999 fine, and other refined forms)

	From Domestic Ore†	From Foreign Ore	Total
1955*	33,100	31,200	64,300
Jan.	3,416	3,125	6,541
Feb.	2,753	2,851	5,604
Mar.	3,560	2,780	6,340
Apr.	3,068	2,896	5,964
May	3,075	2,224	5,299
June	3,089	3,134	6,223
July	596	930	1,526
Aug.	2,005	1,669	3,674
Sept.	2.840	2,855	5,695
1954	38,059	39,422	77,481
Jan.	3,372	2,674	6,046
Feb.	3,163	3,794	6,957
Mar.	3.775	3.729	7,504
Apr.	3.643	3,708	7,351
May	3.229	3,335	6,564
June	3.609	3,212	6,821
July	1,997	2,940	4,937
Aug.	2,779	2,795	5,574
Sept.	2.840	3.797	6,637
Oct.	3,117	3,126	6,243
Nov.	3.366	2,859	6,225
Dec.	3,169	3,453	6,622
1953	34,697	37,764	72,461
1952	40,245	36,653	76,898
1951	39 967	33 837	73,804
1950	42,068	37,656	79,724
1949	34,559	28 226	62,785
1948	36,111	37,680	73,791

†Includes purchases of crude silver by the United States Mint. *Estimated. American Bureau of Metal Statistics.

U. S. Tin Consumption

Long Tons

1955	Consumption Primary	Consumption Secondary	Consumption Total	Stocks
Jan.	4,500	2,400	6,900	25,099
Feb.	4,730	2,550	7,280	26.143
Mar.	5,200	2,850	8,050	26,161
Apr.	5,160	2,660	7,820	23,931
May	5,305	2,660	7,965	24,341
June	5,160	2,625	7,785	24,782
July	4.520	2,120	6,640	28,169
Aug.	5,310	2,675	7,985	28,520
Sept.	5,330	2,630	7,960	29,870
1954	54,427	28,464	82,891	29,552
1953	53,959	31,681	85,640	51,546
1952	45,323	27,950	73,273	46,625
1951	56,884	31,285	88,169	31,532
1950	71,191	33,273	104,464	63,486
1949	47,163	25,243	72,406	59,813
1948	59,863	30,925	90,788	63,517
1947	59,166	28,934	88,100	68,728
1946	54,627	26,316	80,943	60,585
1945	55,642	27,941	83,583	71,408
1944	59,156	30,813	89,969	89,914
1943	46,253	34,077	80,330	105,784

International Tin Study Group; U. S. Bureau of Mines.

Nickel Production

Net Tons

	Canada	Other Countries	Estimated Total
1955* ...	167,000	40,500	207,500
1954† ...	160,000	35,000	195,000
1953	143,000	27,000	170,000
1952	140,560	23,020	163,580
1951	137,900	9,500	147,400
1950	123,660	6,540	130,200
1949	128,690	32,310	161,000
1948	131,740	34,660	166,400
1947	118,621	35,679	154,300
1946	96,062	42,538	138,600
1945	122,565	37,435	160,000
1944	137,299	35,701	173,000
1943	144,009	40,091	184,100
1942	142,606	31,594	174,200
1941	141,129	37,471	178,600
1940	122,779	31,521	154,300
1939	113,053	21,447	134,500
1938	105,286	22,014	127,300

*Estimated. †Preliminary. U. S. Bureau of Mines; Dominion Bureau of Statistics; STEEL.

Tungsten

U. S. Mines—Pounds

1955	Production	Shipments
1st Qtr.	3,442,054	3,207,296
2nd Qtr.	4,033,707	4,108,258
1954†	13,135,798	13,050,508
1st Qtr.	2,595,000	2,453,000
2nd Qtr.	3,215,000	3,111,000
3rd Qtr.	3,585,000	3,823,000
4th Qtr.	3,637,000	3,666,000
1953	9,258,697	9,127,756
1952	7,233,199	7,243,589
1951	5,913,750	5,972,551
1950	3,965,040	4,587,687
1949	2,896,084	2,631,506
1948	4,033,389	3,838,287

†Including quarterly revisions. U. S. Bureau of Mines.

U. S. Tin Smelter Output

Long Tons

	1955	1954	1953	1952	1951
Jan. ...	2,402	2,750	4,000	1,802	3,211
Feb. ...	2,505	3,009	3,400	1,800	3,096
Mar. ...	2,353	3,559	3,850	1,800	3,036
Apr. ...	2,103	3,006	3,750	1,800	3,058
May ...	1,604	2,054	3,100	1,800	3,059
June ...	851	1,205	3,000	0	2,655
July ...	952	0	3,000	0	2,406
Aug. ...	1,749	2,002	2,600	0	2,505
Sept. ...	1,751	2,404	2,700	2,450	2,155
Oct. ...	1,803	2,404	2,751	3,364	2,091
Nov. ...	....	2,205	2,750	4,020	1,806
Dec. ...	....	2,404	2,750	3,705	1,805
Total ..	22,000*	27,002	37,651	22,541	30,883

*Estimated. Office of Domestic Commerce.

World Tin

Long Tons

	Production	Consumption	Stocks
1955*	172,500	150,200	67,000
Jan.	16,700	11,800	65,600
Feb.	14,300	12,300	64,000
Mar.	16.700	13.400	62,500
Apr.	13,100	12,600	62,100
May	13,100	12,800	61,400
June	14.700	12,900	62,200
July	13,800	11,800	65,500
Aug.	14,200	12,600	66,000
1954	183,500	140,500	71,700
1953	181,000	133,000	97,300
1952	168,500	132,000	100,400
1951	167,500	139,500	93,000
1950	174,000	152,000	118,200
1949	168,000	114,500	130,800
1948	157,500	130,000	133,100
1947	124,500	125,000	135,200
1946	90,500	113,000	153,000
1945	89,400	97,500	170,900

*Estimated.
International Tin Study Group. Figures are partly estimated and include substantial revisions from previously reported totals.

Molybdenum Products

Comprises ferromolybdenum, molybdic oxide and molybdenum salts and metal
Pounds

	Production	Shipments†	Stocks
1955			
Jan.	2,792,000	2,452,000	3,808,000
Feb.	2,575,000	2,532,000	3,896,000
Mar.	2,549,000	3,363,000	3,155,000
Apr.	3,227,000	3,465,000	2,983,000
May	3,875,000	3,285,000	3,635 000
June	3,789,000	3,377,000	4,095,000
July	3,384,000	2,817,000	4,697,000
Aug.	1,605,000	3,277,000	3,064,000
1954	24,328,000	25,357,000	3,430 000
1953	30,283,000	30,701,000	3,894,000
1952	32,383,000	32,054,000	3,373,000
1951	32,775,000	31,232,700	3,037,200
1950	25,347,800	34,690,800	1,494,900

†Including exports.
U. S. Bureau of Mines.

Manganese

(Supplies for United States consumption, net tons)

	Domestic Mine Shipments	General Imports Ore	General Imports Ferro-manganese†	Exports Ore	Exports Ferro-manganese†	Net Supply
1955*	302,000	2,100,000	158,500	6,100	3,700	2,550,700
Jan.	27,400	171,530	9,638	488	520	207,560
Feb.	29,000	149,900	11,674	631	346	189,597
Mar.	23,200	111,839	10,386	545	376	144,504
Apr.	23,000	234,656	6,982	509	280	263,849
May	20,400	171,417	9,212	553	100	200,376
June	25,000	185,462	32,768	561	176	242,493
July	28,000	110,219	11,664	258	324	196,000
Aug.	22,500	244,281	15,976	712	696	281,349
1954	211,700	2,166,144	116,088	6,112	4,348	2,483,472
1953	157,536	3,500,986	252,012	6,894	2,936	3,900,704
1952	115,379	2,668,780	126,502	9,748	2,906	2,898,007
1951	105,007	1,767,580	240,980	8,029	1,267	2,104,271

†Expressed in terms of ore. *Estimated. U. S. Bureau of Mines.

Molybdenum Concentrates

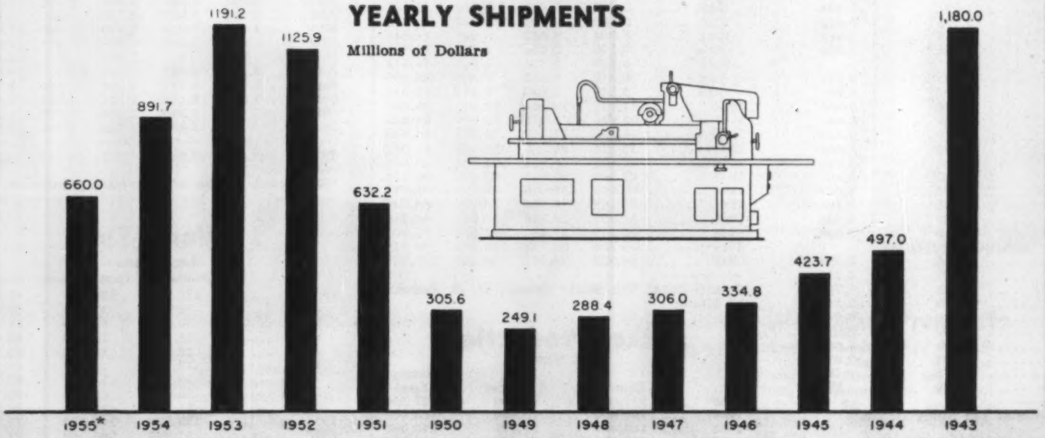
Pounds

1955	Production	Shipments†	Consumption	Stocks
Jan.	5,338,000	8,309,000	2,935,000	2,496,000
Feb.	5,077,000	4,667,000	2,710,000	2,929 000
Mar.	5,893,000	5,064,000	2,683,000	3,724,000
Apr.	5,460,000	5,600,000	3,346,000	3,756,000
May	5,934,000	5,748,000	4,042,000	3,806,000
June	5,440,000	6,092,000	3,913,000	3,456,000
July	3,042,000	4,551,000	3,562,000	1,896,000
Aug.	4,348,000	3,560,000	1,667,000	2,627,000
1954	58,668,000	64,779,000	24,710,000	5,317 000
1953	57,243,000	53,823,000	31,193,000	11,326,000
1952	43,259,000	42,717,000	32,715,000	6,856,000
1951	38,855,000	37,955,000	33,691,000	5,058,000

†Including exports, plus concentrates converted to oxide at Miami, Ariz., and Langeloth, Pa.
U. S. Bureau of Mines.

Machine Tools

METALWORKING FACTS AND FIGURES



INDEX OF MACHINE TOOL NEW ORDERS

Base: Average Shipments in 1945-46-47=100%

TOTAL NEW ORDERS (DOMESTIC AND FOREIGN)

	1955	1954	1953	1952	1951	1950	1949	1948	1947	1946	1945	1944	1943
Jan.	203.0	173.5	255.8	347.8	475.4	99.7	87.0	83.1	71.7	115.6	208.9	100.6	222.8
Feb.	209.4	159.8	282.1	318.8	615.3	89.2	80.9	77.3	63.8	79.8	205.4	118.9	270.4
Mar.	214.6	169.6	327.0	324.3	590.3	107.4	93.5	86.3	74.3	106.3	181.8	143.9	348.6
Apr.	178.1	142.8	276.8	293.5	516.1	98.9	70.1	86.3	69.8	123.4	172.4	194.7	245.4
May	243.7	139.5	246.4	284.6	483.0	116.4	63.7	73.5	76.9	107.9	154.8	207.2	212.9
June	263.2	185.2	273.4	342.9	558.8	124.1	53.6	83.4	90.9	109.1	123.3	182.3	176.6
July	217.8	124.7	247.3	376.3	490.6	253.1	48.0	74.0	81.1	99.0	100.3	121.6	140.2
Aug.	221.3	147.9	286.9	311.1	488.9	305.1	51.5	73.7	62.1	99.9	103.1	147.0	136.2
Sept.	207.3	180.9	223.7	302.4	380.2	280.6	57.7	73.1	63.7	86.4	85.8	125.5	125.5
Oct.	349.7	148.9	198.7	243.3	403.9	289.6	56.8	67.4	81.0	85.3	99.3	206.6	118.1
Nov.	....	119.5	146.6	205.4	330.5	291.9	84.3	72.2	75.6	73.2	89.1	210.6	127.2
Dec.	....	202.9	149.8	225.2	376.5	410.1	82.5	76.7	81.1	72.7	119.4	221.2	114.1
Avg. ..	....	157.9	242.9	298.0	475.8	205.5	69.1	77.3	74.3	96.6	137.0	165.0	186.5

DOMESTIC

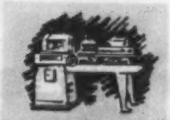
	1955	1954	1953	1952	1951	1950	1949
Jan.	179.4	154.4	229.5	314.2	414.1	73.0	65.1
Feb.	183.1	145.4	259.2	304.4	537.1	70.4	54.4
Mar.	188.9	144.7	309.6	301.0	488.2	82.5	71.2
Apr.	158.8	126.9	262.9	277.9	450.0	81.5	47.0
May	225.0	127.6	231.7	253.2	447.3	98.0	47.9
June	241.4	169.7	256.8	322.6	502.4	101.1	37.9
July	198.7	109.9	228.7	361.4	435.7	230.8	34.0
Aug.	194.6	131.7	269.3	288.4	430.2	270.9	32.7
Sept.	188.6	168.8	207.2	279.3	353.2	253.4	44.0
Oct.	328.4	132.3	177.0	220.8	362.8	240.1	43.1
Nov.	....	101.6	129.7	191.1	301.5	265.3	67.3
Dec.	....	178.3	127.9	205.6	358.2	297.3	60.1
Avg. ..	....	140.9	224.1	276.7	423.4	172.0	50.4

FOREIGN

	1955	1954	1953	1952	1951	1950	1949
Jan.	23.6	19.1	26.3	33.6	61.3	26.7	21.9
Feb.	26.3	14.4	22.9	14.4	78.2	18.8	26.5
Mar.	25.7	24.9	17.4	23.3	102.1	24.9	22.3
Apr.	19.3	15.9	13.9	15.6	66.1	17.4	23.1
May	18.7	11.9	14.7	31.4	35.7	18.4	15.8
June	21.8	15.5	16.6	20.3	56.4	23.0	15.7
July	19.1	14.8	18.6	14.9	54.9	22.3	14.0
Aug.	26.7	16.2	17.6	22.7	58.7	34.2	18.8
Sept.	18.7	12.1	16.5	23.1	27.0	27.2	13.7
Oct.	21.3	16.6	21.7	22.5	41.1	49.5	13.7
Nov.	...	17.9	16.9	14.3	29.0	26.6	17.0
Dec.	...	24.6	21.9	19.6	18.3	112.8	22.4
Avg. ..	....	17.0	18.8	21.3	52.4	33.5	18.7

National Machine Tool Builders' Association.

* Estimated.



Machine Tools

METALWORKING FACTS AND FIGURES

INDEX OF MACHINE TOOL SHIPMENTS

Base: Average Shipments in 1945-46-47=100%

	1955	1954	1953	1952	1951	1950	1949	1948	1947	1946	1945	1944	1943
Jan.	167.3	319.4	361.6	266.6	114.3	52.8	68.8	75.3	91.7	105.9	130.0	190.6	297.0
Feb.	168.2	323.1	354.5	279.6	123.8	56.1	70.3	87.1	92.4	94.2	125.9	169.6	387.5
Mar.	202.5	327.2	375.9	299.5	158.9	75.3	75.8	83.6	100.4	95.2	140.4	175.5	424.2
Apr.	180.1	302.7	372.7	307.9	157.7	61.6	74.7	82.0	93.3	99.0	142.6	139.9	399.1
May	180.9	270.3	356.0	323.0	175.1	82.5	72.8	82.6	89.2	94.2	140.5	141.4	385.1
June	198.8	276.3	342.2	330.8	182.8	91.9	79.0	94.4	84.1	99.8	146.0	140.2	367.7
July	152.9	205.7	267.6	259.7	144.7	68.3	60.7	62.4	65.2	78.3	115.4	110.8	329.9
Aug.	164.6	203.7	299.6	317.0	178.9	95.7	67.3	69.8	63.6	92.5	113.1	119.0	296.9
Sept.	195.4	213.4	328.3	368.3	189.8	101.6	67.6	84.7	77.0	87.5	96.3	121.4	290.3
Oct.	204.8	191.0	348.4	357.8	221.3	100.9	62.3	80.4	94.8	99.9	109.5	126.9	264.8
Nov.	....	179.5	320.2	342.5	226.0	110.9	67.6	76.2	84.7	90.4	91.6	122.7	243.0
Dec.	....	203.4	301.4	355.0	264.7	135.7	75.7	96.9	98.4	95.2	81.7	128.8	205.7
Avg.	....	251.3	335.7	317.3	178.2	86.1	70.2	81.3	86.2	94.3	119.4	140.6	324.3

National Machine Tool Builders' Association.

PRODUCERS' SHIPMENTS OF MACHINE TOOLS

CLASSES OF MACHINE TOOLS	1954 Dollar Value and No. Units	1953 Dollar Value and No. Units	1952 Dollar Value and No. Units	1951 Dollar Value and No. Units	1950 Dollar Value and No. Units	1949 Dollar Value and No. Units
Boring Machines	$118,289,000 n.a.	$163,648,000 4,650 Units	$152,341,000 4,374 Units	$75,068,000 2,518 Units	$29,402,000 1,363 Units	$29,430,000 1,212 Units
Broaching Machines	16,429,000 n.a.	21,874,000 799 Units	22,678,000 1,105 Units	11,975,000 681 Units	4,883,000 374 Units	3,411,000 290 Units
Drilling Machines	124,039,000 n.a.	114,258,000 n.a.	108,948,000 30,492 Units	70,916,000 19,257 Units	33,129,000 9,917 Units	25,271,000 6,305 Units
Gear-cutting and Finishing Machines	51,751,000 n.a.	44,891,000 2,546 Units	47,462,000 2,725 Units	38,336,000 2,452 Units	19,819,000 1,404 Units	14,231,000 1,095 Units
Grinding and Polishing Machines (except gear-tooth grinding, honing, lapping, polishing and buffing machines)	112,539,000 n.a.	219,287,000 93,804 Units	210,124,000 89,146 Units	120,833,000 105,090 Units	60,859,000 79,274 Units	45,660,000 64,257 Units
Lathes	220,970,000 n.a.	312,165,000 43,077 Units	281,587,000 44,525 Units	170,528,000 43,107 Units	89,716,000 30,251 Units	62,289,000 18,631 Units
Milling Machines	115,824,000 n.a.	196,124,000 17,525 Units	159,331,000 16,252 Units	70,257,000 11,287 Units	36,452,000 6,975 Units	31,400,000 4,397 Units
Planers	15,608,000 n.a.	10,445,000 164 Units	8,641,000 158 Units	6,638,000 141 Units	3,035,000 84 Units	3,699,000 99 Units
Shapers (except gear shapers)	n.a. n.a.	10,932,000 1,495 Units	9,755,000 1,493 Units	6,095,000 1,096 Units	3,397,000 794 Units	2,831,000 666 Units
All Other Machine Tools	46,001,000 n.a.	75,735,000 n.a.	76,013,000 n.a.	58,698,000 n.a.	35,051,000 n.a.	23,148,000 n.a.
Total Machine Tools	$821,450,000 n.a.	$1,169,359,000 n.a.	$1,076,880,000 n.a.	$629,344,000 n.a.	$315,743,000 n.a.	$241,370,000 n.a.

U. S. Bureau of the Census.

n.a.=not available.

Machinery & Equipment

METALWORKING FACTS AND FIGURES

WELDING ELECTRODES

Shipments in Pounds

	Mild Steel	Alloy	Nonferrous	Total
1955				
9 Mos. .	303,703,820	53,767,040	1,195,365	358,666,225
Jan. ...	28,468,814	5,107.434	116,490	33,692,738
Feb. ...	28,758,366	5,345,566	119,786	34,223,718
Mar. ...	35,241,906	6,808,508	161,052	42,211,466
Apr. ...	36,418,951	6,268,033	118,438	42,805,422
May ...	36,125,103	5,694,846	119,588	41,939,537
June ...	41,613,223	7,138,819	145,164	48,897,206
July ...	28,628,655	4,574,580	90,149	33,293,384
Aug. ...	32,737,120	5,525,590	118,809	38,381,519
Sept. ..	35,711,682	7,303,664	205,889	43,221,235
Oct. ...	....	....	......	....
Nov. ...	....	....	......	....
Dec. ...	....	....	......	....
1954	324,260,613	52,781,433	1,340,081	378,382,127
1953	409,437,791	76,049,553	1,889,653	487,376,997
1952	425,290,499	82,633,922	1,519,208	509,443,629
1951	413,444,913	65,903,970	1,361,836	480,710,719
1950	322,954,832	42,574,710	1,861,686	367,391,228
1949	273,463,740	24,753,807	1,715,362	299,932,909
1948	369,019,831	30,214,928	2,124,496	401,359,255
1947	307,756,495	25,172,382	2,149,768	335,078,645
1946	284,126,356	24,991,208†	....	309,117,564
1945	435,789,217	59,029,938†	....	494,819,155
1944	707,756,964	69,236,137†	....	776,993,101
1943	....	....	....	971,929,782

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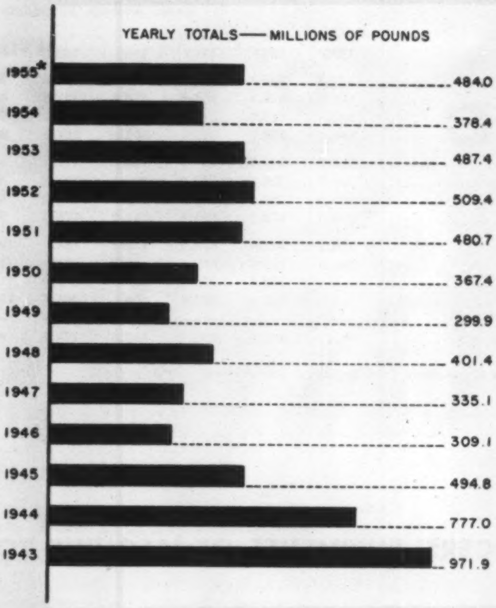
†Includes both alloy and nonferrous electrodes. *Estimated.
National Electrical Manufacturers Association.



Blowers and Fans

Shipments—Thousands of Dollars

Qtrs.	1955	1954	1953	1952
1st	54,464	54,943	43,591	32,359
2nd	54,990	59,839	55,090	40,099
3rd	58,869	44,177	48,011	37,403
4th	.....	38,811	43,037	32,795
Total ..	.....	197,770	189,729	142,656

U. S. Bureau of the Census.

Air Washers

Shipments—Thousands of Dollars

Qtrs.	1955	1954	1953	1952
1st	301	207	220	222
2nd	406	343	218	313
3rd	261	436	317	308
4th	...	385	378	381
Total ..	...	1,371	1,133	1,224

U. S. Bureau of the Census.

Unit Heaters

Shipments—Thousands of Dollars

Qtrs.	1955	1954	1953	1952
1st	14.089	13.803	11,817	13,376
2nd	14,538	12,408	12,001	11,119
3rd	15,475	14.172	16,076	13,085
4th	.....	17,856	18,479	15,728
Total ..	.....	58,239	58,373	53,308

U. S. Bureau of the Census.

Air Conditioning, Commercial Refrigeration Equipment

Factory Shipments—Number of Units and Value in Thousands of Dollars

	CONDENSING UNITS		COMPRESSORS, COMPRESSOR UNITS		ICE-MAKING MACHINES	
	Number	Value	Number	Value	Number	Value
1953	966,136	74,013	2,380,739	121.054	28,222	14.385
1952	654,223	61,439	1,677.300	71.047	26.693	12,838
1951	840,176	75,672	1,051,937	56.669	12.998	8,804
1950	885,913	75,833	954.368	46.977	14.914	8,907
1949	610,341	53,534	604.431	29,929	6,902	4,641
1948	841,609	73,443	459,390	33.493	5,947	5.266
1947	1,039,772	98,296	n.a.	34.586	7,822	3,122
1946	755,538	55,379	191,770	15,377	n.a.	n.a.

	CENTRIFUGAL REFRIGERATION SYSTEMS		HEAT EXCHANGER EQUIPMENT		SELF-CONTAINED AIR-CONDITIONING UNITS	
	Number	Value	Number	Value	Number	Value
1953	469	14,970	......	52,602	1,137,293	293,644
1952	363	14,040	......	63,666	438,464	135.579
1951	441	15,300	......	64,935	282.488	93.873
1950	382	12,249	......	61.337	257,263	86,913
1949	285	8,189	......	40.925	123.709	50.554
1948	361	10,351	......	48,552	111,620	49,008
1947	313	7,814	......	63,025	74.976	39.509
1946	312	6,593	......	40,451	47,664	19,500

Figures for 1954 are delayed until 1954 Survey of Manufactures is issued.
U. S. Bureau of the Census.
n.a.=not available.

Industrial Control Apparatus

Sales

Qtr.	1955	1954	1953	1952	1951	1950
1st	$41,932,375	$45,125,499	$50,057,978	$50,265.710	$38,268,776	$23,841,436
2nd	48,017.382	47,066.497	53.213.139	54.427,788	46.397,618	27,663,410
3rd	48,617,670	41,922,808	49.444,714	49,085,727	44.551.726	29,872,967
4th	....	45,138,667	52,641,399	55,129,668	50,715,549	37,821,630
Total	....	$179,253,471	$205,357,230	$208,908,893	$179,933,669	$119,199,443

National Electrical Manufacturers Association.

Machinery & Equipment

METALWORKING FACTS AND FIGURES

Industrial Supplies and Machinery

New Order Index—July, 1948=100

	1955	1954	1953	1952	1951	1950	1949
Jan.	164.4	139.8	157.4	n.a.	223.4	103.0	101.5
Feb.	175.1	140.5	172.9	n.a.	239.0	108.7	95.8
Mar.	186.9	141.5	188.2	n.a.	220.6	118.1	92.7
Apr.	173.7	131.9	182.1	n.a.	206.7	114.8	81.6
May	191.6	129.4	171.1	n.a.	183.8	118.5	78.6
June	189.1	136.4	160.0	n.a.	n.a.	131.4	76.4
July	163.7	119.4	155.3	140.1	n.a.	143.1	68.5
Aug.	181.2	132.5	139.6	128.8	n.a.	195.3	77.9
Sept.	203.2	148.1	150.6	157.9	n.a.	187.9	89.0
Oct.	190.0	136.3	146.0	158.4	n.a.	185.6	91.8
Nov.	....	146.2	144.8	145.9	n.a.	186.3	91.6
Dec.	....	148.8	136.7	161.1	n.a.	184.8	89.4
Mo. Av. ...	....	137.6	158.7	....	....	148.1	86.2

American Supply & Machinery Manufacturers' Association Inc. n.a.=not available.

Screw Machine Products

Index—1946-1949=100

SHIPMENTS

	1955	1954	1953	1952	1951
Jan.	173	174	244	225	205
Feb.	174	161	225	218	191
Mar.	199	171	256	223	200
Apr.	204	158	256	170	204
May	201	146	252	203	194
June	212	143	250	198	204
July	144	109	215	148	162
Aug.	187	140	232	178	197
Sept.	190	143	217	174	177
Oct.	199	154	217	201	206
Nov.	...	148	188	206	192
Dec.	...	158	178	238	270

Yearly Averages

1954..........	150	1952..........	199
1953..........	228	1951..........	200

NEW ORDERS

	1955	1954	1953	1952	1951
Jan.	186	130	193	158	277
Feb.	191	118	236	179	281
Mar.	239	131	259	171	300
Apr.	198	133	251	201	277
May	201	123	208	203	241
June	191	126	215	213	246
July	183	114	174	164	162
Aug.	220	133	153	181	230
Sept.	208	150	134	184	170
Oct.	209	151	162	214	194
Nov.	...	166	139	205	206
Dec.	...	199	130	250	221

Yearly Averages

1954..........	140	1952..........	194
1953..........	188	1951..........	234

National Screw Machine Products Association.

Pumps

(Steam, power, centrifugal, rotary)

New Orders—Thousands of Dollars

	1955	1954	1953	1952	1951
Jan. ..	5,220	4,057	5,752	5,517	6,477
Feb. ..	6,709	4,272	6,521	6,020	6,480
Mar. ..	6,161	5,093	8,255	5,925	7,654
Apr. ..	5.447	5,319	7,758	6,354	7,583
May ..	5,834	5,007	4,629	6,140	6,371
June ..	7,419	5,176	5,690	7,957	6,852
July ..	6,411	4,733	5,533	6,299	8,358
Aug. ..	7,022	6,706	4,886	5,921	5,911
Sept. .	5,664	5,050	4,845	5,258	6,552
Oct. ..	....	3,828	5,097	5,534	6,506
Nov. ..	....	5,224	4,634	4,130	5,908
Dec. ..	....	4,787	4,645	6,575	5,553
Total .	....	59,252	68,245	71,630	80,205

MONTHLY AVERAGES

1954........	4,938	1949........	3,032
1953........	5,687	1948........	3,932
1952........	5,969	1947........	3,332
1951........	6.684	1946........	3,105
1950........	4,450	1945........	2,869

Hydraulic Institute.

Foundry Equipment Sales

Index of Net Orders Closed for New Equipment

1947-1949=100

	1955	1954	1953
January	81.0	173.8	99.6
February	90.4	99.9	97.5
March	163.6	82.7	132.2
April	178.6	125.3	111.8
May	145.7	80.8	182.1
June	186.8	86.4	156.4
July	213.4	68.8	158.9
August	134.0	75.6	235.5
September	156.7	68.3	127.7
October	....	147.5	87.2
November	....	61.4	150.0
December	....	113.9	161.2

Foundry Equipment Manufacturers Association.

Industrial Trucks and Tractors

ELECTRIC TRUCKS (Rider Type)

Units Shipped

	1955	1954	1953	1952	1951
Jan.	342	523	704	658	440
Feb.	359	467	779	681	461
Mar.	425	473	832	702	595
Apr.	406	366	732	643	397
May	833	445	677	652	464
June	533	445	945	648	604
July	455	413	673	394	538
Aug.	346	357	626	564	591
Sept.	441	357	797	516	447
Oct.	...	348	877	588	587
Nov.	...	359	677	622	728
Dec.	...	394	673	741	673
Totals ...	...	4,947	8,992	7,409	6,525

YEARLY TOTALS

1950........	2,808	1948........	3,447
1949........	2,600	1947........	4,131

HAND TRUCKS (Motorized)

Units Shipped

1955			
Jan.	387	July	521
Feb.	444	Aug.	506
Mar.	507	Sept.	670
Apr.	476	Oct.	...
May	678	Nov.	...
June	578	Dec.	...

GASOLINE-POWERED TRUCKS AND TRACTORS

Units Shipped

1955			
Jan.	1,449	July	1,961
Feb.	1.652	Aug.	2,163
Mar.	1,808	Sept.	2,463
Apr.	1,647	Oct.	....
May	3,926	Nov.	....
June	2,188	Dec.	....

U. S. Bureau of the Census.

Steel Power Boilers

New Orders

(100 sq ft or more of heating surface)

GRAND TOTAL—ALL TYPES

	Number	Sq ft
1954	5,496	8,472,185
1953	5,693	9,440,439
1952	5,815	12,707,581
1951	7,452	19,224,576
1950	7,996	16,868,565
1949	5.266	8,379,502
1948	6,507	13,592,766
1947	8,175	14,896,051
1946	10,548	18,773,979

STATIONARY BOILERS

	Number	Sq ft
1954*	5,496	8,472,185
1953	5,658	9,243,028
1952	5,556	11,693,401
1951	7,171	17,698,094
1950	7,827	16,468,567
1949	5,190	8,097,503
1948	6,354	12,628,660
1947	8,140	14,786,298
1946	10,452	18,652,274

MARINE BOILERS

	Number	Sq ft
1954	n.a.	n.a.
1953	35	197,411
1952	259	1,014,180
1951	281	1,526,482
1950	169	399,998
1949	76	281,999
1948	153	964,106
1947	35	109,753
1946	96	121,705

Steam Generating Capacity of Water Tube Boilers

(Thousands of pounds of steam per hour at maximum continuous rating)

	Total	Stationary	Marine
1954....	90.669	90 669†	n.a.
1953....	82.263	80.634	1.629
1952....	129.474	121.374	8.100
1951....	209.088	194.082	15.006
1950....	187.514	184.831	2.683
1949....	67.678	62.745	4.933
1948....	119.650	109.762	9.888
1947....	129.293	128.096	1,197
1946....	137,570	136,547	1,023

†Includes marine boilers.
n.a.=not available.
U. S. Bureau of the Census.

Motors and Generators

New Orders—Thousands of Dollars

Polyphase Induc. Motors, 1-200 hp

Qtrs.	1955	1954	1953
1st	38.649	35.208	41,127
2nd	44,407	36 817	46.319
3rd	.....	33.448	42.088
4th	.....	34.476	36,341
Total	.....	139,949	165,875

DC Generators & Motors, 1-200 hp

Qtrs.	1955	1954	1953
1st	6.729	9.533	7,512
2nd	10,545	7.958	8,821
3rd	.....	6.755	7.917
4th	.....	8.130	7,883
Total	.....	32,376	32,133

YEARLY TOTALS

Polyphase Induc. Motors, 1-200 hp		DC Generators & Motors, 1-200 hp	
1952	152.800	1952	40.483
1951	209.861	1951	43.318
1950	155.308	1950	28.874
1949	76.063	1949	16.900
1948	95.577	1948	22.273
1947	122,043	1947	20.381
1946	142.464	1946	20,942
1945	87,621	1945	37,194

National Electrical Mfrs. Assn.

Machinery & Equipment

METALWORKING FACTS AND FIGURES

EARTHMOVING and EXCAVATING EQUIPMENT

(Value in thousands of dollars)

Total Manufacturers' Shipments†

	Units	Value
1955	....	.....
1st Qtr.	....	$148,465
2nd Qtr.	....	183,440
3rd Qtr.	....	159,414
4th Qtr.	....	.....
1953	....	$612,913
1952	....	623,261
1954	....	$543,352
1st Qtr.	....	120,976
2nd Qtr.	....	156,086
3rd Qtr.	....	128,565
4th Qtr.	....	137,725
1951	....	$584,278
1950	....	453,140

†Does not include power cranes and shovels.

Wheel-type Heavy Duty Industrial Tractors

	Units	Value
1955	....	.....
1st Qtr.	933	$13,808
2nd Qtr.	1,236	19,118
3rd Qtr.	1,132	18,402
4th Qtr.	....	.....
1954	3,019	$46,801
1st Qtr.	580	8,446
2nd Qtr.	897	13,905
3rd Qtr.	737	11,389
4th Qtr.	805	13,061
1953	2,944	$43,681
1952	4,026	59,847
1951	3,505	55,238
1950	2,065	24,769
1949	1,047	12,499

Road Construction and Maintenance Machinery

	Units	Value
1955	....	.....
1st Qtr.	....	$36,147
2nd Qtr.	....	43,318
3rd Qtr.	....	37,501
4th Qtr.	....	.....
1954	....	$118,970
1st Qtr.	....	26,880
2nd Qtr.	....	35,196
3rd Qtr.	....	28,660
4th Qtr.	....	28,234
1953	....	$119,674
1952	....	160,068
1951	....	151,779
1950	....	117,540
1949	....	96,883

Construction Machinery for Mounting on Tractors

	Units	Value
1955	....	.....
1st Qtr.	....	$19,238
2nd Qtr.	....	24,392
3rd Qtr.	....	22,487
4th Qtr.	....	.....
1954	....	$73,877
1st Qtr.	....	17,742
2nd Qtr.	....	20,942
3rd Qtr.	....	17,405
4th Qtr.	....	17,788
1953	....	$78,440
1952	....	75,829
1951	....	64,816
1950	....	58,769
1949	....	38,177

U. S. Bureau of the Census.

Tracklaying Tractors

	Units	Value
1955	....	.....
1st Qtr.	11,551	$76,003
2nd Qtr.	13,717	92,412
3rd Qtr.	10,190	77,202
4th Qtr.	....	.....
1954	40,374	$267,918
1st Qtr.	9,299	60,207
2nd Qtr.	11,447	74,731
3rd Qtr.	9,419	63,041
4th Qtr.	10,209	69,939
1953	50,597	$328,696
1952	48,155	280,841
1951	48,322	263,579
1950	43,590	223,042
1949	42,749	196,622

Portable Well and Blast Hole Drills

	Units	Value
1955	....	.....
1st Qtr,	303	$1,885
2nd Qtr.	360	2,290
3rd Qtr.	323	2,230
4th Qtr.	....	.....
1954	1,176	$8,615
1st Qtr.	269	2,229
2nd Qtr.	329	2,458
3rd Qtr.	306	1,988
4th Qtr.	272	1,940
1953	907	$8,002
1952	732	6,769
1951	660	5,818
1950	627	4,472
1949	807	6,774

Trucks, Truck Tractors, Trailers and Wagons

OFF-HIGHWAY TYPE

	Units	Value
1955	....	.....
1st Qtr.	94	$703
2nd Qtr.	147	1,344
3rd Qtr.	130	1,207
4th Qtr.	....	.....
1954	1,519	$25,126
1st Qtr.	287	5,016
2nd Qtr.	529	8,193
3rd Qtr.	325	5,485
4th Qtr.	378	6,432
1953	1,970	$31,184
1952	2,283	32,805
1951	2,611	36,840
1950	1,908	22,856

Gear Sales

Indexes of New Orders Placed

1947-1948-1949=100 per cent

	1955	1954	1953	1952
Jan.	140.9	167.4	161.4	670.6†
Feb.	148.5	165.1	188.1	539.5†
Mar.	172.8	128.6	158.9	517.1†
Apr.	179.8	158.2	217.1	478.7†
May	205.2	134.3	189.8	425.9†
June	193.5	127.4	146.5	452.3†
July	201.7	141.3	120.7	145.3
Aug.	217.6	154.7	121.6	132.3
Sept.	246.5	135.1	135.6	143.4
Oct.	227.6	152.3	211.1	160.8
Nov.	....	116.7	144.9	150.7
Dec.	....	182.2	194.0	140.9

†Average Month 1935-1939=100 per cent.
American Gear Manufacturers Association.

Rigid Steel Conduit and Fittings

Shipments—Thousands of Feet

	1955	1954	1953
January	24,049	16,133	21,567
February	25,898	17,230	23,379
March	29,762	20,306	26,311
April	30,521	20,770	25,519
May	32,504	21,784	23,646
June	35,310	26,171	28,551
July	53,017	28,544	34,048
August	31,611	28,076	16,871
September	.....	27,616	17,057
October	.....	27,622	18,043
November	.....	29,645	17,488
December	.....	25,911	17,756
Totals	.....	289,808	270,236

National Electrical Manufacturers Association.

Industrial Furnaces†

Net New Orders—Thousands

	1955	1954	1953
January	$4,973	$3,643	$5,398
February	5,616	3,086	6,009
March	7,345	4,079	5,101
April	7,639	3,496	5,140
May	6,205	5,848	4,698
June	10,616	5,663	4,910
July	4,338	1,664	6,334
August	6,273	2,571	7,519
September	8,351	2,534	4,442
October	9,575	3,837	3,486
November	....	3,188	3,430
December	....	6,847	3,081
Total	....	$46,456	$67,947‡

†Includes electric, fuel-fired and all other types.
‡Includes $7,976,000 for furnaces for hot-rolled steel mills and $423,000 for combustion equipment not shown in monthly figures.
Industrial Heating Equipment Association Inc.

Induction and Dielectric Heating Equipment

Net New Orders—Thousands

	1955	1954†
January	$1,031	....
February	966	....
March	1,417	....
April	760	....
May	1,559	....
June	1,365	....
July	1,417	$1,580
August	1,759	830
September	1,108	439
October	963	1,014
November	....	1,266
December	....	1,500
Total	....	$10,387

†Total includes $3,758 for first half.
Industrial Heating Equip. Assn. Inc.

Machinery & Equipment

METALWORKING FACTS AND FIGURES

METALWORKING MACHINERY (Forming and Shaping Types)

Shipments

1955	Bending, Forming Machines	Hydraul., Pneumatic Presses	Mechanical-Power Driven Presses	Manual Presses	Punching, Shearing Machines	Forging Machines, Hammers	Wire, Met. Ribbon Form. Machines	Riveting Machines	Misc. Forming, Cutting Machines
1st Qtr.	$4,858	$8,215	$28,650	$71	$4,032	$3,511	$658	$902	$1,285
2nd Qtr.	6,134	6,935	27,520	109	4,337	1,960	898	690	1,464
3rd Qtr.	5,940	6,195	23,122	66	4,257	2,180	711	701	1,552
4th Qtr.	....	....	.....	...	....	....	...	...	....
1954	$21,365	$40,719	$142,766	$754	$16,086	$14,578	$2,513	$3,268	$9,300

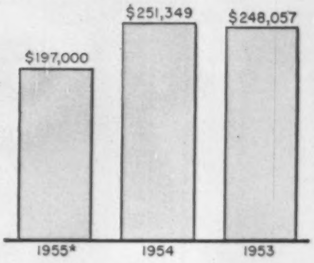
New Orders

1955	Bending, Forming Machines	Hydraul., Pneumatic Presses	Mechanical-Power Driven Presses	Manual Presses	Punching, Shearing Machines	Forging Machines, Hammers	Wire, Met. Ribbon Form. Machines	Riveting Machines	Misc. Forming, Cutting Machines
1st Qtr.	$6 458	$3,932	$27,439	$128	$5,568	$3,186	$655	$724	$2,925
2nd Qtr.	7,520	8,258	72,878	65	6,192	2,947	1,121	748	2,500
3rd Qtr.	7,079	8,506	94,542	139	5,576	2,957	1,134	707	2,276
4th Qtr.	....	....	.....	...	....	....	...	...	....
1954	$18,463	$25,386	$83,742	$330	$13,682	$9,561	$1,813	$2,802	$9,067

U. S. Bureau of the Census.

VALUE OF FACTORY SHIPMENTS

(Thousands)



*Estimated.

Arc Welding Sets

Units Ordered. Excluding Exports

	Single Operator, Variable Voltage, DC Sets			Transformer Welders	
	Motor Drive	Engine Drive	Generators Only	Industrial Type	Limited Input Type
1955					
Jan. ..	1.285	632	10	959	1,063
Feb. ..	1.297	556	14	1,314	1,126
Mar. ..	1.618	858	16	1,397	1,448
Apr. ..	1.318	792	27	1,276	1,295
May ..	1 362	841	46	1,127	1,151
June ..	1.636	850	12	1,251	1,085
July ..	1.372	791	17	1,092	956
Aug. ..	1.513	805	19	1,259	1,413
Sept. ..	1.684	838	15	1,265	1,419
Oct. ..	....	...	..	....	....
Nov. ..	....	...	..	....	....
Dec. ..	....	...	..	....	....
1954	12.817	7,450	340	12,220	10,310
Jan. ..	925	435	11	811	667
Feb. ..	957	584	27	723	989
Mar. ..	1.306	745	39	1,176	1,319
Apr. ..	1.132	701	17	1,115	1,143
May ..	914	634	69	978	807
June ..	1.019	702	33	1,261	466
July ..	981	586	43	773	535
Aug. ..	986	607	29	1,081	936
Sept. ..	1.266	655	22	1,350	1,055
Oct. ..	1.112	661	15	1,028	779
Nov. ..	1.014	609	19	957	721
Dec. ..	1.175	531	16	967	893
1953	16 362	9.673	435	13.009	10.595
1952	18 932†	11 104	227	16.794	18.489
1951	13.048†	10 333	485	15.645	16.954
1950	10 115†	8 207	272	9.652	16.674
1949	7 303†	6.193	256	7.295	12.647
1948	10 927†	10 435	385	8.792	13.690
1947	13 677†	10 822	1,169	9,719	13.034
1946	16.467†	10 622	2.818	21,093	16.949
1945	20 716†	8 776	2.795	21.448	
1944	30 230†	6.023	3.140	15.426	
1943	30 437†	4.747	2 068	4.439	
1942	60.264†	5.051	2.674	8,236	

†Does not include rectifier type.
National Electrical Manufacturers Association.

Contract Stampings Shipments

Index—1947-1949=100

1955

Month	Index	Month	Index	Month	Index
Jan. ..	150	May ..	154	Sept. ..	140
Feb. ..	139	June ..	142	Oct. ..	120
Mar. ..	167	July ..	110	Nov. ..	...
Apr. ..	129	Aug. ..	140	Dec. ..	...

1954

Month	Index	Month	Index	Month	Index
Jan. ..	155	May ..	136	Sept. ..	111
Feb. ..	161	June ..	117	Oct. ..	125
Mar. ..	158	July ..	89	Nov. ..	121
Apr. ..	161	Aug. ..	114	Dec. ..	138

YEARLY AVERAGES

1955 (10 Mos.) .. 139   1954.......... 132

Pressed Metal Institute.

INTERNAL COMBUSTION ENGINES

(Except Automotive and Aircraft)

Factory Shipments

Type	Total Engines Produced	No. Used In Own Product	Shipped To Other Firms Number Engines	Shipped To Other Firms Value (thousands)
1953				
Gasoline (except outboard and miniature)	3,025,550	819,586	2,205.964	$171.289
Diesel	117,628	59,529	58.099	181.729
Outboard	463,355	......	463.355	67.045
Gas	9.615	6,482	3.133	37.615
Dual-fuel	8,972	4,324	4.648	10.743
Total	3,625,120	889,921	2,735,199	$468,421
1952				
Gasoline (except outboard and miniature)	2,945.050	719.436	2,225.614	$188.647
Diesel	120.538	56,060	63.878	184.575
Outboard	337,419	......	337.419	46.129
Gas	8.624	4.713	3.911	47.249
Dual-fuel	10,177	4,929	5.248	10.847
Total	3.421,808	785.138	2.636,070	$477.447
1951				
Gasoline (except outboard and miniature)	3,103.551	931.285	2,172,266	$183.877
Diesel	129,203	62,653	66.550	166.377
Outboard	291,697	......	291.697	39.456
Gas and dual-fuel	28,072	12.408	15.664	71.184
Total	3,552,523	1,006,346	2,546.177	$460,894

Figures for 1954 are delayed until 1954 Survey of Manufactures is issued.
U. S. Bureau of the Census.

BEARINGS IMPORTS

Ball Bearings and Parts

1955†	lb	Value
1st 9 Mos.	866.084	$1,778.584
1954†	376 397	576.383
1953	808.641	1,090.100
1952	928.940	1,453.539
1951	843.706	1,541,301
1950	85.027	156.496
1949	12.349	47.979
1948	14,396	55.091
1947	15,973	39.426
1946	48,845	106.953
1945	54,424	84.636

Roller Bearings and Parts

1955†	lb	Value
1st 9 Mos.	463.219	$ 730.093
1954†	278.099	463.077
1953	881.330	1,307.201
1952	899.189	1,289.746
1951	901.351	1,244.019
1950	88.622	117.673
1949	14 464	38.955
1948	59.538	127.680
1947	40.432	67,144
1946	71.325	127,435
1945	21,455	26,381

†Does not include shipments valued at less than $250.
Foreign Trade Division, U. S. Bureau of the Census.

Appliances

METALWORKING FACTS AND FIGURES

Floor and Wall Furnaces

Factory Shipments

	1955		1954	
	Number of Units	Value, Thousands of Dollars	Number of Units	Value, Thousands of Dollars
Jan. ..	38.509	2,272	30,772	2,024
Feb. ..	37.607	2.344	28.756	1,857
Mar. ..	40.531	2,486	31,777	2.013
Apr. ..	40.391	2.569	34.269	2,291
May ..	39,021	2,567	33,921	2,197
June ..	37.440	2,401	41.364	2,665
July ..	38,082	2.478	40.938	2,634
Aug. ..	56.935	3,853	58.391	3.885
Sept. .	64,835	4,444	68.107	4.555
Oct. ..	.....	....	76.032	4,940
Nov. ..	.....	....	60,402	3.863
Dec. ..	.....	....	45,165	2,766
Total.	.....	....	549,894	35.690

YEARLY TOTALS

	Number of Units	Value, Thousands of Dollars
1953	546.913	34.554
1952	547.796	34.383
1951	507,283	30.601

U. S. Bureau of the Census.

Oil Burners

	1955		1954	
	Residential	Com'l., Indus'l.	Residential	Com'l., Indus'l.
Jan. ..	38,842	2,248	28,943	2,052
Feb. ..	38,797	2,035	27.117	2,502
Mar. ..	38,851	2.391	30,789	2,333
Apr. ..	38.718	2.207	32,070	2,213
May ..	39,695	2,887	33,008	2,559
June ..	40,919	3,205	44,695	3,138
July ..	44.420	2,664	40.275	2,672
Aug. ..	59,715	4,159	55,997	3,995
Sept. .	68,133	4,168	62,299	3,738
Oct. ..	.....	....	68,706	3,575
Nov. ..	.....	....	41,629	3,210
Dec. ..	.....	....	28,731	2,334
Total.	.....	....	494,259	34,321

YEARLY TOTALS

	Residential	Com'l., Indus'l.		Residential	Com'l., Indus'l.
1953..	619.062	36,417	1945..	139.611	30,750
1952..	744.619	38.425	1944..	45.752†	31.329
1951..	661,251	40.565	1943..	27,956†	44,602
1950..	879,922	33.447	1942..	82.357†	48.674
1949..	569 445	24.465	1941..	271,673†	32,196
1948..	392,625	27,043	1940..	247,633†	16.569
1947..	1,078.576	48,776	1939..	201,735†	13,295
1946..	499,009	37,306	1938..	129.323†	9.888

†Includes water heating units.
U. S. Bureau of the Census.

Oil Cooking Stoves

(Kerosene, Gasoline and Fuel Oil)
Shipments—Units

	1955	1954	1953	1952
Jan.	9,123	8,946	8,347	8,105
Feb.	8,343	8,437	10.081	11,229
Mar.	8,902	9.422	10,429	10,281
Apr.	9,920	8.313	10,492	9,188
May	7,840	9,229	10,726	9,783
June	7,892	8,932	7,146	10,433
July	5,427	6.582	6,180	8,159
Aug.	12,471	9,676	9.231	9,438
Sept.	12,182	10.184	8,363	11,485
Oct.	....	11,652	10,361	13,153
Nov.	....	9,127	10,151	9.173
Dec.	....	8,773	9,972	9,501

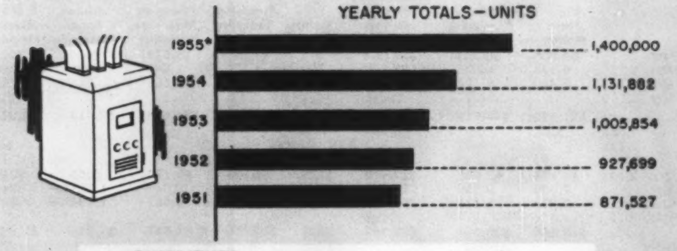
YEARLY TOTALS

1954..109.273	1952..119.928	1950..190,776
1953..111,479	1951..132,833	1949..185,939

U. S. Bureau of the Census.

WARM AIR FURNACES

(Cast Iron and Steel)



SHIPMENTS

	1955		1954	
	Number of Units	Value, Thousands of Dollars	Number of Units	Value, Thousands of Dollars
Jan.	85.476	15,920	57.192	11.458
Feb.	79.537	14.947	57.217	11.373
Mar. ...	87.121	16.405	69.280	13.592
Apr.	91,908	17.310	72.488	13,954
May	99,937	18,414	82,462	15,246
June	117,376	21,742	95,359	18,159
July	107,905	20,329	92,463	17,666
Aug. ...	163.741	31,026	130,486	25,074
Sept. ...	164,154	32,391	148.370	28,925
Oct.	......	.....	137.820	26,418
Nov. ...	......	.....	107,615	20,699
Dec.	......	.....	81,130	15,475
Total .	......	.....	1.131.882	218,039

Yearly Totals	Number of Units	Value, in dollars
1953	1,005.854	202,384.000
1952	927.699	187.987.000
1951	871.527	180.848.000
1950	1,099.734	205,484,000
1949	719,972	130,548 000
1948	776.548	136.936.932
1947	850,783	141,943,102

U. S. Bureau of the Census. *Estimated.

Forced Air Furnaces

Shipments—Number of Units

	Solid Fuel	Oil	Gas	Total
1955				
9 Mos. .	10,055	342,761	581,351	934,167
Jan. ...	733	31,416	48,294	80,443
Feb. ...	735	28,462	45,048	74,245
Mar. ...	763	30,150	51,423	82,336
Apr. ...	606	31,145	55,858	87.609
May ...	726	33.898	59.606	94,230
June ...	828	39,128	70,429	110,385
July ...	1,371	38,458	60,807	100,636
Aug. ...	1,953	56,924	94,026	152,903
Sept. ..	2,340	53,180	95,860	151,380
Oct. ...	....	.....	.....	.....
Nov. ...	....	.....	.....	.....
Dec. ...	....	.....	.....	.....
1954	13,748	413,277	597,017	1,024,042
Jan. ...	562	23,176	27,698	51,436
Feb. ...	461	23,437	27.638	51,536
Mar. ...	636	25,970	35,567	62,173
Apr. ...	394	26.029	39,108	65,531
May ..	575	28.592	44.009	73,176
June ...	912	33,059	50,816	84,787
July ...	1,030	34,528	48,454	84,012
Aug. ...	1.803	47,293	68,047	117,143
Sept. ..	2,939	56,117	75,142	134,198
Oct. ...	2,172	49,644	72,624	124,440
Nov. ...	1,562	37,798	60,210	99,570
Dec. ...	702	27,634	47,704	76,040
1953	16,280	403.207	443,510	862,997
1952	21,262	345.433	398,889	765,584
1951	27,505	313,453	324,339	665,297
1950	30,145	344,181	465.327	839.653

U. S. Bureau of the Census.

Gravity Air-Flow Furnaces

Shipments—Number of Units

	Solid Fuel	Oil	Gas	Total
1955				
9 Mos. .	26.432	4,789	31.767	62,988
Jan. ...	1,921	483	2,629	5,033
Feb. ...	2,145	455	2,692	5,292
Mar. ...	2,175	360	2,250	4,785
Apr. ...	1,806	339	2,154	4.299
May ...	2,231	386	3,090	5.707
June ...	2,766	529	3,696	6,991
July ...	3,069	444	3.756	7,269
Aug. ...	4.438	868	5,532	10.838
Sept. ..	5,881	925	5,968	12,774
Oct. ...	....	....	....	....
Nov. ...	....	....	....	....
Dec. ...	....	....	....	....
1954	37,285	11,938	58,617	107,840
Jan. ...	1,841	686	3,229	5,756
Feb. ...	1,984	830	2,867	5,681
Mar. ...	1,947	857	4,303	7,107
Apr. ...	1,646	853	4,458	6,957
May ...	2,016	1,618	5,652	9,286
June ...	3,295	864	6,413	10,572
July ...	2,843	946	4,662	8,451
Aug. ...	4,966	1,362	7,015	13,343
Sept. ..	5,905	1,386	6,881	14,172
Oct. ...	5,663	1.319	6.398	13,380
Nov. ...	3,147	796	4,102	8,045
Dec. ...	2,032	421	2,637	5.090
1953	55,625	17,874	60,107	133 606
1952	79.231	18 033	64.851	162,115
1951	119.368	18,330	68,532	206,230
1950	107,585	18,003	134,493	260,081

U. S. Bureau of the Census.

Cast Iron Radiators and Convectors

Shipments in thousands of square feet of radiation

	1955	1954	1953
January	1,675	2,041	2,634
February	1,970	1,896	2,621
March	2,419	1,732	2,435
April	2,035	2,285	1,740
May	1,732	1,745	1,821
June	2,208	2,208	2,477
July	1,865	1,937	2,591
August	3,615	3,315	3,345
September	....	3,217	3,336
October	....	3,354	3,840
November	....	2,700	2,782
December	....	1,956	2,095
Total	....	28,386	31,717

YEARLY TOTALS

1952	36,898	1950	48,175
1951	42,512	1949	35,888

U. S. Bureau of the Census.

Plumbing Fixtures

Shipments—Value in Thousands

VITREOUS CHINA AND GLAZED EARTHENWARE

Qtr.	1955	1954	1953	1952
1st	$30,536	$24,604	$22,228	$19,212
2nd	33,828	24,586	22,109	21,121
3rd	35,216	25,971	24,069	23,657
4th	.....	28,449	22,641	21,240
Total	......	$103,610	$91,047	$85,230

ALL METAL—EXCLUSIVE OF FITTINGS

Qtr.	1955	1954	1953	1952
1st	$54,528	$44.333	$45,706	$39.174
2nd	58,779	47.029	48,159	43.819
3rd	58,693	53.285	49,644	48.886
4th	.....	52,057	43,181	44,257
Total	......	$196,704	$186,690	$176,136

CAST IRON

Qtr.	1955	1954	1953	1952
1st	$37,385	$30,560	$30,536	$26,062
2nd	39,233	29,744	32,767	30,168
3rd	39,217	35,454	33,265	33,191
4th	.....	35,063	28,671	30,233
Total	......	$130,821	$125,239	$119.654

STEEL

Qtr.	1955	1954	1953	1952
1st	$16,977	$13.650	$14,957	$12.884
2nd	19,385	17,150	15,166	13,419
3rd	19,324	17,688	16,129	15,477
4th	.....	16,883	14,335	13,806
Total	......	$65,371	$60,587	$55,586

ALUMINUM, MONEL & OTHER METAL

Qtr.	1955	1954	1953	1952
1st	$166	$123	$213	$228
2nd	161	135	226	232
3rd	152	143	250	218
4th	...	111	175	218
Total	....	$512	$864	$896

YEARLY TOTALS

VITREOUS CHINA AND GLAZED EARTHENWARE

1951	$108,243	1950	$102,332

ALL METAL—EXCLUSIVE OF FITTINGS

1951	$202,530	1950	$212,675

CAST IRON

1951	$141,920	1950	$144,527

STEEL

1951	$59,404	1950	$65,850

ALUMINUM, MONEL & OTHER METAL

1951	$1,206	1950	$2,298

U. S. Bureau of the Census.

Domestic Heating Stoves

Shipments

	Coal, Wood†	Gas	Oil‡	Total
1955				
9 Mos.	179,400	909,892	482,684	1,571,976
Jan.	4,824	41,646	28,534	75,004
Feb.	4,422	38,228	48,247	90,897
Mar.	7,710	50,350	47,297	105,357
Apr.	8,624	50,311	39,372	98,307
May	10,624	74,605	37,493	122,722
June	15,589	116,854	53,758	186,201
July	26,304	142,723	64,171	233,198
Aug.	45,107	185,481	80,576	311,164
Sept.	56,196	209,694	83,236	349,126
Oct.	.....	.....	.....	.....
Nov.	.....	.....	.....	.....
Dec.	.....	.....	.....	.....
1954	271,197	1,387,517	661,125	2,319,839
Jan.	4,471	40,791	43,427	88,689
Feb.	6,117	33,364	35,061	74,542
Mar.	7,242	44,691	42,462	94,395
Apr.	6,804	77,109	42,906	126,819
May	6,474	76,427	43,080	125,981
June	10,935	111,796	57,592	180,323
July	23,443	114,195	66,263	203,901
Aug.	36,879	156,343	68,714	261,936
Sept.	55,091	205,345	90,699	351,135
Oct.	66,824	257,606	92,755	417,185
Nov.	37,823	195,337	51,528	284,688
Dec.	9,094	74,513	26,638	110,245

YEARLY TOTALS

1953	331,601	1,674,161	972,919	2,978,681
1952	449,099	1,786,360	1,113,600	3,349,059
1951	450,941	1,896,619	1,238,840	3,586,400

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† Excludes sheet metal airtight type.
‡ Includes kerosene stoves.
U. S. Bureau of the Census.

Electric Lamps (Bulbs)

Manufacturers' Shipments
Value in Thousands of Dollars

	Domestic	Export	Total
1955—6 Mos.	152,574	7,740	160,314
1954	290,615	11,439	302,054
1953	277,529	11,819	289,348
1952	229,899	8,206	238,105
1951	252,465	11,670	264,135
1950	233,860	9,297	243,157
1949	192,638	7,240	199,878
1948	199,291	8,879	208,170

PRODUCTION

Thousands of Lamps

1954	2,246,400	1951	2,341,154
1953	2,247,637	1950	2,084,607
1952	n.a	1949	1,832,423

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n.a. = not available.
U. S. Bureau of the Census.

Receiving Tubes

(Manufacturers' Sales)

	Number	Value
1955 (9 Mos.)	347,668,000	$257,544,000
January	37,951,000	26,879,000
February	38,526,000	28,108,000
March	40,859,000	29,743,000
April	35,426,000	26,780,000
May	32,919,000	25,916,000
June	40,821,000	31,256,000
July	28,340,000	21,167,000
August	45,238,000	33,099,000
September	47,588,000	34,596,000
October	....	....
November	....	....
December	....	....
1954	385,089,458	$275,998,903

Radio-Electronics-Television Mfrs. Assn.

Television Picture Tubes

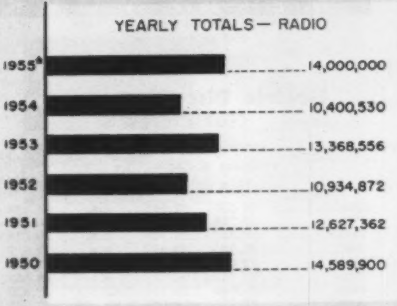
(Manufacturers' Sales)

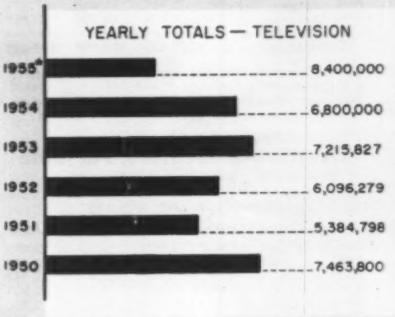
	Number	Value
1955 (9 Mos.)	7,680,781	$147,022,146
January	866,956	17,661,018
February	859,529	17,119,568
March	913,003	17,625,881
April	788,317	14,620,075
May	779,329	14,572,518
June	706,890	13,244,499
July	515,793	9,498,169
August	1,048,534	19,812,567
September	1,202,430	22,867,851
October	......	....
November	......	....
December	......	....
1954	9,913,504	$209,182,344

Radio-Electronics-Television Mfrs. Assn.

RADIO AND TELEVISION RECEIVERS

Number Produced





RADIOS

	Home	Portable	Auto	Clock
1955				
9 Mos.	2,209,944	1,495,059	4,980,457	1,341,902
Jan.	280,121	47,303	573,837	166,885
Feb.	232,831	109,120	597,742	150,031
Mar.	300,840	233,465	774,025	173,944
Apr.	193,431	265,866	567,876	72,602
May	161,357	258,701	563,369	130,608
June	181,930	255,833	584,567	182,605
July	141,119	79,410	404,443	93,517
Aug.	300,513	106,197	403,320	137,604
Sept.	417,802	139,164	511,278	234,106
Oct.	......	......	......	......
Nov.	......	......	......	......
Dec.	......	......	......	......

TOTAL RADIOS PRODUCED

1955—9 Mos. 10,027,362

Jan.	1,608,146	July	718,489
Feb.	1,089,724	Aug.	947,634
Mar.	1,482,274	Sept.	1,302,350
Apr.	1,099,775	Oct.	....
May	1,114,035	Nov.	....
June	1,204,935	Dec.	....

YEARLY TOTALS

	Units	Value (Manufacturers')
1954	10.400,530	$208,000,000
1953	13,368,556	293,573,490
1952	10,934,872	249,847,000
1951	12,627,362	315,936,597
1950	14,589,900	375,000,000

TELEVISION

1955—9 Mos. 5,760,506

Jan.	654,582	July	344,295
Feb.	702,514	Aug.	647,903
Mar.	831,156	Sept.	939,515
Apr.	583,174	Oct.	......
May	467,394	Nov.	......
June	589,973	Dec.	......

YEARLY TOTALS

	Units	Value (Manufacturers')
1954	7,346,715	$1,040,466,000
1953	7,215,827	1,170,151,000
1952	6,096,279	1,049,000,000
1951	5,384,798	956,986,300
1950	7,463,800	1,350,000,000

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*Estimated.
n.a. = not available.
Radio-Electronics-Television Mfrs. Assn.

Appliances

Electric Disc Stoves and Hot Plates

(1650 Watts or Less)
Sales Billed—Units

	1955	1954	1953†	1952
Jan.	23.697	37.545	n.a.	21.178
Feb.	30.214	41.796	n.a.	25.435
Mar.	30.853	27.165	n.a.	25,617
Apr.	22.930	20.807	n.a.	21.839
May	29 018	24.022	n.a.	17.368
June	27.722	22.412	n.a.	20.503
July	31.569	28.136	42.137	17.323
Aug.	42.220	48.891	63.099	53.945
Sept.	48.028	42.719	53.426	35.811
Oct.	.....	33 254	52.093	30,979
Nov.	.....	33 487	41.610	37,271
Dec.	.....	16,885	26.157	29.569
Total ...	.....	377.119	532.056	336,838

†Total includes 253.534 units for first half.
n.a.=not available.
National Electrical Manufacturers Association.

Electric Air Heaters, Portable

Sales Billed—Units

CONVECTOR AND RADIANT

	1955	1954	1953†	1952
Jan.	2,579	3,905	n.a.	3,885
Feb.	2,114	1,487	n.a.	2,433
Mar.	939	461	n.a.	2.167
Apr.	915	209	n.a.	1.951
May	1,228	1,750	n.a.	2,232
June	1,458	1,285	n.a.	2,524
July	8.257	5 312	10.018	7.955
Aug.	16.940	25 338	23.723	27.564
Sept.	33,718	36.238	41.113	13.943
Oct.	.....	27 236	33.221	15.854
Nov.	.....	19,655	17.172	17.695
Dec.	.....	6.454	4.398	11,185
Total ...	.....	129.330	146,975	109,388

FAN FORCED AND FAN AND HEATER COMBINATION

	1955	1954	1953‡
Jan.	16.690	24.705	n.a.
Feb.	11.863	11.001	n.a.
Mar.	4,113	6.106	n.a.
Apr.	4 515	4.688	n.a.
May	25.556	16.874	n.a.
June	34 799	15 234	n.a.
July	53.499	40.057	59.771
Aug.	82.070	105 090	90.640
Sept.	129.677	110 647	101.281
Oct.	.....	92.520	120.109
Nov.	.....	79 419	64.929
Dec.	.....	39 429	32.116
Total	......	545.760	573.306

†Total includes 17.330 units for first half.
‡Total includes 104.460 units for first half.
n.a.=not available.
National Electrical Manufacturers Association.

Electric Coffee Makers, Pots & Urns

Vacuum (glass & metal) and Percolators
Sales Billed—Units

	1955	1954	1953†	1952
Jan. ..	151.449	241.464	n.a.	49.927
Feb. ..	170 448	256,161	n.a.	88.678
Mar. ..	265.929	207.866	n.a.	123 320
Apr. ..	122.218	182.575	n.a.	58,158
May ..	137.713	185.773	n.a.	69.769
June ..	170.498	205.540	n.a.	53.503
July ..	185.046	182.922	227.277	59 757
Aug. ..	251 419	249.581	322.324	91.869
Sept. .	413.961	323.760	388.130	157,884
Oct. ..	......	378.822	404.945	177.306
Nov. ..	......	256.348	323 931	164.670
Dec. ..	......	193.571	246.904	170.556
Total	......	2.678.808	3.258.394	1.265.397

†Total includes 1.344,883 units for first half.
n.a.=not available.
National Electrical Manufacturers Association.

Electric Grills and Waffle Irons

Sales Billed—Units

Sandwich Grills & Griddles, Waffle Irons & Combination Grills & Waffle Irons

	1955	1954	1953†
Jan. ...	57,126	37.467	n.a.
Feb. ...	55,904	35.716	n.a.
Mar. ...	51.896	34.767	n.a.
Apr. ...	52,073	25,740	n.a.
May ...	28,143	27,488	n.a.
June ...	33.858	41.032	n.a.
July ...	69,914	70,034	108,054
Aug. ...	76,225	112,640	146.900
Sept. ...	107.570	114.669	155,136
Oct. ...	.....	86.089	125,145
Nov. ...	.....	64,709	81,263
Dec. ...	.....	49,214	43,333
Total .	.....	699,565	1,042,381

†Total includes 382,550 units for first half.

n.a.=not available.

National Electrical Manufacturers Association.

Electric Freezers

(Home and Farm)
Sales Billed—Units

	1955	1954	1953	1952
Jan.	56.672	49,017	85.239	44,147
Feb.	61.000	50.594	83,661	50,127
Mar.	63,631	52,114	111,888	52,344
Apr.	58,473	64.297	89.031	49.422
May	57.618	59,728	70,279	71.774
June	77,527	76,819	62,375	98,871
July	72,706	61,145	66,712	89,767
Aug.	58,445	57.509	59,497	77,873
Sept.	72,987	63,268	58,140	83,942
Oct.	.....	53,330	41,371	77,901
Nov.	.....	40,321	29,800	57,617
Dec.	.....	40,746	36.695	60.301
Total ...	.....	668,888	794,688	814,086

National Electrical Manufacturers Association.

Deep Fat Fryers

Sales Billed—Units

	1955	1954	1953†
Jan.	16,979	29,714	n.a.
Feb.	19,302	31,976	n.a.
Mar.	12,197	19,146	n.a.
Apr.	9,019	23,511	n.a.
May	12,544	20,888	n.a.
June	11,085	17,616	n.a.
July	19,883	22,888	36,696
Aug.	18,648	33,377	58,290
Sept.	36,421	35,199	67.681
Oct.	.....	36.258	61,058
Nov.	.....	30.775	35.486
Dec.	.....	24,010	29,146
Total	.....	325,358	433,737

†Total includes 145,380 units for first half.
n.a.=not available.
National Electrical Manufacturers Association.

Steel Kitchen Cabinets

(Including steel cabinet sink units)
(Factory Sales)

	Units	Retail Value
1955	4,046.000	$209.328,000
1954	3,372.000	174.440,000
1953	3,441,000	178.000,000
1952	2,970.000	154.000.000
1951	2,871.000	128.850,500
1950	2,969 000	125,848,500
1949	2,658,000	105,000,000

Steel Kitchen Cabinet Manufacturers Assn. Inc.

Electric Toasters

Sales Billed—Units

AUTOMATIC

	1955	1954	1953†	1952
Jan. ..	156,967	119.972	n.a.	118,624
Feb. ..	132,864	115,732	n.a.	141,851
Mar. ..	126,824	97,883	n.a.	99,540
Apr. ..	92,281	76,833	n.a.	63,654
May ..	101.970	81.400	n.a.	74,817
June ..	185,028	118,171	n.a.	82,566
July ..	241,794	209.360	206.686	210,207
Aug. ..	338,797	310,476	250,421	289,303
Sept. .	270,346	318,845	290,968	269,262
Oct. ..	......	306,878	298,394	285,981
Nov. ..	......	258,171	260,313	231,390
Dec. ..	......	142,685	201,303	132,235
Total.	......	2,156,406	2,304,851	1,999,430

NONAUTOMATIC

	1955	1954	1953‡	1952
Jan. ..	14,739	21,889	n.a.	1,783
Feb. ..	10,411	15,324	n.a.	2,992
Mar. ..	15,502	12,323	n.a.	1,234
Apr. ..	14,749	10,391	n.a.	1,218
May ..	14,034	13,683	n.a.	1,130
June ..	12,720	18,466	n.a.	927
July ..	12,530	14,495	27,635	4,118
Aug. ..	21,598	19,935	27,350	9,824
Sept. .	17,330	37,110	35,537	3,592
Oct. ..	.....	37,791	35,289	8,003
Nov. ..	.....	19,884	23,609	2,753
Dec. ..	.....	13,371	22,261	2,599
Total.	.....	234,662	300,800	40,173

†Total includes 796,766 units for first half.
‡Total includes 129,119 units for first half.
n.a.=not available.
National Electrical Manufacturers Association.

Standard-Size Ironers

Factory Sales—Units

	1955	1954	1953	1952
Jan.	8,648	9,792	24,395	15,636
Feb.	8,241	8,208	22,588	17,630
Mar.	7,750	6,025	16 066	13,913
Apr.	6,050	8,388	14,080	8,938
May	6,558	7,210	9,323	12,652
June	6,017	5,185	12,529	17,654
July	5,071	5,227	9,626	15,025
Aug.	6,105	5,925	8,067	16,477
Sept.	9,114	8,905	9,113	22,492
Oct.	7,509	9,021	11,666	25,204
Nov.	....	6,427	10,105	19,724
Dec.	....	5,892	6,908	16,798

YEARLY TOTALS

1954.......	86,205	1949.......	279,491
1953.......	154,466	1948.......	381,612
1952.......	202,143	1947.......	366,849
1951.......	269,946	1946.......	124,616
1950.......	396,715	1945.......	4,593

American Home Laundry Manufacturers' Association.

Coal and Wood Cooking Stoves

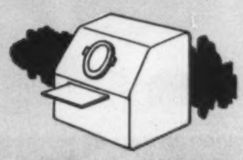
Shipments—Units

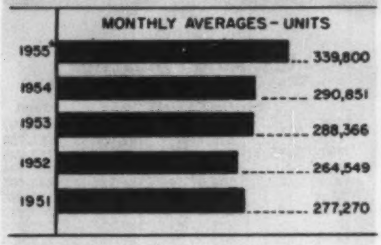
	1955	1954	1953	1952
Jan.	5,564	4,683	8,723	10,116
Feb.	5,527	6,110	8,089	10,204
Mar.	6,063	5,643	8,125	9,241
Apr	4,283	5,876	7,420	8,091
May	4,107	3,468	5,075	6,883
June	4,817	4,206	5,435	6,318
July	5,367	4,351	5,796	7,696
Aug.	6,460	6,294	7,006	9,437
Sept.	7,752	7,708	9,636	9,655
Oct.	....	7,320	7,543	10,523
Nov.	....	6,652	6,876	8,411
Dec.	....	5,586	5,516	8,911

YEARLY TOTALS

1954...	67,897	1952...	105,486	1950...	151,162
1953...	85,240	1951...	120,700	1949...	169,928

U. S. Bureau of the Census.





WASHERS

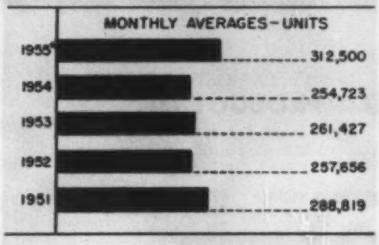
Sales Billed—Units

	1955	1954	1953
Jan.	357,354	249,956	282,478
Feb.	353,214	295,171	333,410
Mar.	370,555	307,862	352,436
Apr.	313,461	258,712	292,065
May	341,759	246,944	290,744
June	354,470	303,455	308,613
July	245,879	242,863	228,268
Aug.	403,770	293,243	291,260
Sept. ...	414,914	379,666	340,532
Oct.	362,335	339,169	310,867
Nov.	......	308,368	238,153
Dec.	......	264,803	191,570

YEARLY TOTALS

1954....	3,490,212	1951....	3,327,236
1953....	3,460,396	1950....	4,311,018
1952....	3,174,588	1949....	2,978,445

American Home Laundry Manufacturers' Association.



ELECTRIC REFRIGERATORS

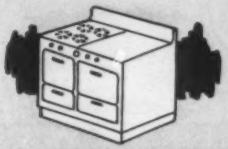
Domestic Sales—Units

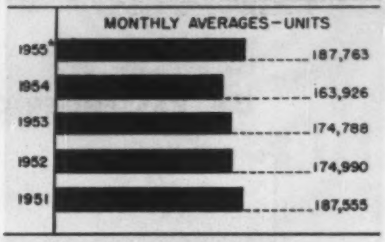
	1955	1954	1953
Jan.	361,981	325,806	325,186
Feb.	318,812	308,707	351,696
Mar.	359,574	303,535	368,496
Apr.	327,700	249,388	327,629
May	354,837	252,712	275,392
June	358,798	278,576	302,095
July	301,638	302,402	298,838
Aug.	291,376	240,693	214,181
Sept.	289,623	250,071	212,823
Oct.	......	173,767	158,773
Nov.	......	160,781	120,290
Dec.	......	210,239	181,731

YEARLY TOTALS

1954....	3,056,677	1948....	3,976,091
1953....	3,137,130	1947....	2,994,297
1952....	3,091,878	1946....	1,811,326
1951....	3,465,824	1945....	267,061
1950....	5,637,108	1944....	40,034
1949....	3,704,269	1943....	156,697

* Estimated.
National Electrical Manufacturers Assn.





HOUSEHOLD GAS RANGES

Shipments—Units

	1955	1954	1953
Jan.	151,309	134,716	166,262
Feb.	184,173	149,620	183,205
Mar.	215,404	185,502	202,957
Apr.	180,339	168,946	212,776
May	184,253	159,779	173,424
June	201,160	170,099	159,099
July	143,478	130,639	152,314
Aug.	213,773	172,590	179,313
Sept.	212,262	194,743	195,999
Oct.	......	189,505	192,150
Nov.	......	168,805	150,759
Dec.	......	142,169	129,204

YEARLY TOTALS

1954....	1,967,113	1951....	2,250,656
1953....	2,097,462	1950....	2,893,681
1952....	2,099,879	1949....	1,994,203

U. S. Bureau of the Census.

Automatic Tumbler Dryers

Factory Sales—Units

	1955	1954	1953	1952
Jan.	115,383	82,195	62,260	45,121
Feb.	109,215	62,488	57,136	44,540
Mar.	113,498	54,796	49,593	41,161
Apr.	73,978	37,661	28,556	36,109
May	49,228	26,533	32,867	28,812
June	70,616	30,297	32,789	31,720
July	60,516	40,755	33,296	33,858
Aug.	136,190	80,165	70,774	53,376
Sept	169,905	107,084	86,461	71,516
Oct.	166,889	122,182	81,839	83,510
Nov.	......	138,254	78,167	74,370
Dec.	......	115,341	82,730	70,584
Total ...	......	897,751	696,468	614,677

American Home Laundry Manufacturers' Association.

Household Electric Ranges

Domestic Sales—Units

	1955	1954	1953
Jan.	134,782	100,676	108,145
Feb.	125,351	108,063	112,512
Mar.	127,298	112,232	127,545
Apr.	105,566	90,940	115,759
May	106,199	80,812	110,766
June	102,430	83,517	109,943
July	83,652	79,013	77,836
Aug.	72,304	74,283	71,893
Sept.	98,345	97,585	81,888
Oct.	......	82,873	70,685
Nov.	......	77,383	54,011
Dec.	......	83,339	72,628

YEARLY TOTALS

1954......	1,070,716	1948......	1,341,497
1953......	1,113,611	1947......	1,016,536
1952......	901,860	1946......	542,168
1951......	1,244,645	1945......	146,046
1950......	1,580,613	1944......	42,712
1949......	887,953	1943......	8,480

National Electrical Manufacturers Association.

Standard Vacuum Cleaners

Sales Billed—Units

	1955	1954	1953
Jan.	250,123	221,233	255,886
Feb.	262,651	199,035	246,007
Mar.	358,179	276,464	329,294
Apr.	244,143	220,849	268,548
May	261,238	209,434	252,404
June	241,665	195,781	197,506
July	207,758	193,607	159,446
Aug.	255,540	185,397	185,029
Sept.	308,345	238,235	227,253
Oct.	350,696	263,197	249,383
Nov.	......	237,882	216,227
Dec.	......	217,022	190,773

YEARLY TOTALS

1954......	2,658,136	1951......	2,729,104
1953......	2,777,756	1950......	3,529,412
1952......	2,841,803	1949......	2,886,514

Vacuum Cleaner Manufacturers' Association.

Gas Water Heaters

Shipments—Underfired and Sidearm Types

	—1955—		—1954—	
	Units	Value, Thousands of Dollars	Units	Value, Thousands of Dollars
Jan.	200,001	10,696	161,152	8,398
Feb.	214,703	11,299	171,490	9,084
Mar.	248,754	13,467	184,043	9,790
Apr.	231,694	12,534	196,767	9,424
May	216,731	11,964	191,660	10,055
June	214,607	11,729	202,574	10,716
July	207,226	10,901	186,528	9,704
Aug.	260,438	14,153	202,990	10,565
Sept.	224,027	12,122	201,405	10,536
Oct.	......	.....	198,061	10,282
Nov.	......	.....	175,550	9,195
Dec.	......	.....	163,458	8,681

YEARLY TOTALS

	Units	Value
1954	2,235,618	$116,430,000
1953	2,274,032	117,220,000
1952	1,995,534	95,547,000

U. S. Bureau of the Census.

Electric Flat Irons

Sales Billed—Units

	1955	1954	1953†
January	297,830	269,594	n.a.
February ...	338,551	366,559	n.a.
March	421,919	402,640	n.a.
April	343,181	214,059	n.a.
May	381,055	215,320	n.a.
June	737,103	307,866	n.a.
July	584,584	628,867	329,793
August	499,913	634,392	561,433
September ..	781,010	709,934	970,481
October	......	650,232	638,111
November ...	......	708,514	657,836
December ...	......	333,252	410,186
Total	......	5,441,229	6,444,730

YEARLY TOTALS

1952......	5,255,044	1950......	5,866,575
1951......	6,012,727	1949......	3,935,185

† Total includes 2,876,890 units for first half.
n.a.=not available.
National Electrical Manufacturers Association.

Electric Water Heaters

Domestic Unit Sales of Storage Tank Type

	1955	1954	1953
January	47,067	41,136	47,623
February	57,063	46,062	48,408
March	63,829	55,684	60,802
April	58,105	53,110	60,879
May	63,143	52,773	54,606
June	69,729	54,837	51,419
July	58,246	50,096	49,194
August	53,046	49,248	44,996
September	65,591	60,730	53,411
October	.....	48,182	49,200
November	.....	43,033	35,125
December	.....	37,279	33,110

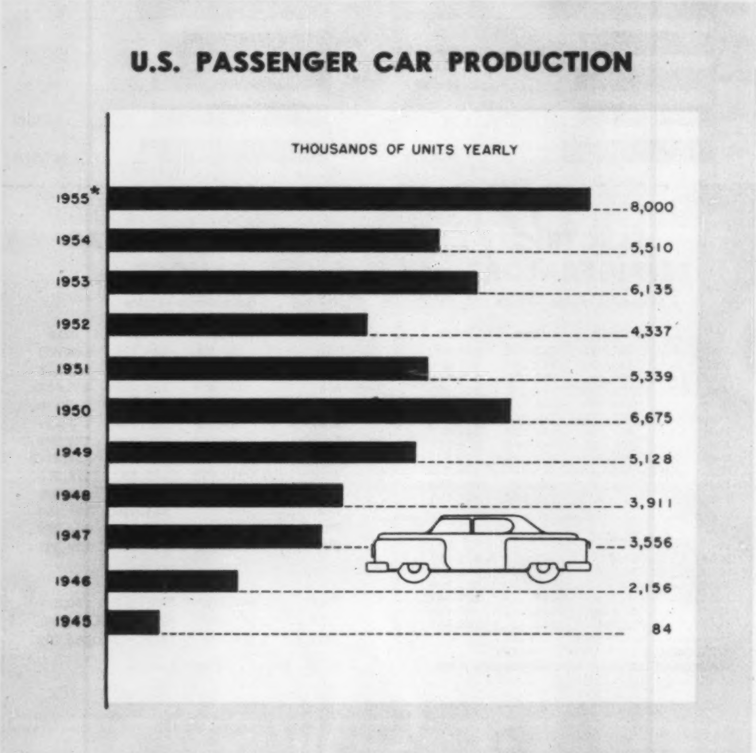
YEARLY TOTALS

1954.......	592,170	1949.......	508,814
1953.......	588,773	1948.......	706,389
1952.......	546,307	1947.......	817,717
1951.......	661,459	1946.......	399,826
1950.......	798,687	1945.......	129,722

National Electrical Manufacturers Association.

Transportation

METALWORKING FACTS AND FIGURES



U.S. PASSENGER CAR PRODUCTION

TRUCK TRAILERS

	Production, By Types of Trailers									Shipments	
	Vans	Tanks	Pole, Pipe & Logging	Plat-forms	Low-Bed Heavy Haul-ers	Dump Trailers	All Other†	Trailer Chas-sis Only	Total Pro-duction Units	Units	Value (000)
1955											
9 Mos.	34,092	4,203	1,823	8,001	2,146	1,525	2,943	2,099	56,832	55,272	$266,313
Jan.	2,849	369	124	648	197	90	325	148	4,750	4,453	21,422
Feb.	3,091	430	130	745	183	95	355	197	5,226	4,939	23,369
Mar.	3,739	496	204	857	285	167	392	262	6,402	6,335	29,885
Apr.	3,704	450	204	890	290	173	357	292	6,360	6,352	29,803
May	3,843	424	222	843	262	188	252	302	6,336	6,262	29,537
June	4,491	528	256	1,027	302	199	279	286	7,368	6,948	33,037
July	3,593	416	277	832	211	179	291	190	5,989	5,889	28,782
Aug.	4,483	519	211	1,096	187	202	340	204	7,242	7,038	34,954
Sept.	4.299	571	195	1,063	229	232	352	218	7,159	7,056	35,524
Oct.	....	....	....	....	....	....	....	....	....	....	.....
Nov.	....	....	....	....	....	....	....	....	....	....	.....
Dec.	....	....	....	....	....	....	....	....	....	....	.....
1954	26,185	6,143	1,349	7,090	3,174	1,090	8,074	2,294	55,399	54,582	$245,501
Jan.	1,899	349	96	447	590	50	1,154	139	4,724	4,677	17,126
Feb.	1,767	424	104	522	494	47	1,144	165	4,667	4,224	17,170
Mar.	1,879	567	94	612	432	93	1,064	259	5,000	4,859	19,711
Apr.	1,865	599	128	458	223	144	1,118	211	4,746	4,470	18,839
May	1,934	539	167	506	235	110	1,147	206	4,844	4,539	18,537
June	2,479	571	121	573	219	114	900	271	5,248	5,085	21,718
July	1,858	499	86	556	155	105	198	221	3,678	4,168	21,114
Aug.	2,052	542	76	642	156	80	192	159	3,899	4,076	20,277
Sept.	2,256	500	105	736	144	77	287	166	4,271	4,146	20,240
Oct.	2,551	472	127	669	190	95	252	165	4,521	4,626	23,550
Nov.	2,822	544	101	726	177	81	292	133	4,876	4,941	24,218
Dec.	2.823	537	144	643	159	94	326	199	4.925	4.771	23,001

YEARLY TOTALS

	Production, Units	Shipments Units	Shipments Value		Production, Units	Shipments Units	Shipments Value
1953	97,102	96,699	$294,849,000	1950	64,617	65,966	$229,685,000
1952	58,078	57,973	228,378,000	1949	33,097	34,273	119,098,000
1951	67,384	64,691	245,315,000	1948	44,478	46,960	139,996,000

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†Includes off-highway, auto transport, public utility trailers and converter dollies.
U. S. Bureau of the Census.

U.S. Auto Production

	Passenger Cars	Trucks	Total
1955*	8,000,000	1,253,500	9,253,500
Jan.	659,719	92,050	751,769
Feb.	675,769	61,857	737,626
Mar.	794,188	110,298	904,486
Apr.	754,077	128,924	883,001
May	724,891	130,121	855,012
June	649,372	119,740	769,112
July	659,979	107,297	767,276
Aug.	614,392	97,564	711,956
Sept.	461,592	87,578	549,170
Oct.	517,696	96,050	613,746
Nov.	748,559	......	......
Dec.	......	......	......
1954	5,509,550	1,022,609	6,532,159
Jan.	456,765	97,134	553,899
Feb.	443,257	85,944	529,201
Mar.	526,076	100,813	626,889
Apr.	533,470	96,361	629,831
May	494,250	89,030	583,280
June	504,811	88,624	593,435
July	441,451	76,248	517,699
Aug.	436,654	73,443	510,097
Sept.	285,859	66,916	352,775
Oct.	236,520	63,712	300,232
Nov.	508,466	90,388	598,854
Dec.	641,971	93,996	735,967
1953	6,134,534	1,203,835	7,338,369
1952	4,337,481	1,218,045	5,555,526
1951	5,338,820	1,412,149	6,750,969
1950	6,674,933	1,344,227	8,019,160
1949	5,128,187	1,132,138	6,260,325
1948	3,910,700	1,369,472	5,280,172
1947	3,556,126	1,236,703	4,792,829
1946	2,155,935	942,317	3,098,252
1945	83,786	701,090	784,876
1944	......	791,357	791,357

Canadian Auto Production

	Passenger Cars	Trucks	Total
1955*	366,000	73,000	439,000
Jan.	25,602	3,409	29,011
Feb.	29,770	3,134	32,904
Mar.	43,824	6,717	50,541
Apr.	42,866	11,127	53,993
May	46,339	11,906	58,245
June	45,105	10,814	55,919
July	38,878	9,170	48,048
Aug.	18,807	5,276	24,083
Sept.	15,474	3,328	18,802
Oct.	20,250	2,978	23,228
Nov.	......	......	......
Dec.	......	......	......
1954	285,595	66.331	351,926
Jan.	33,158	7,707	40,865
Feb.	35,999	9,041	45,040
Mar.	36,771	9,198	45,969
Apr.	37,505	8,933	46,438
May	31,411	6,627	38,038
June	24,433	5,672	30,105
July	20,662	4,983	25,645
Aug.	11,411	2,022	13,433
Sept.	8,800	2,580	11,380
Oct.	8,712	3,082	11,794
Nov.	14,349	2,905	17,254
Dec.	22,384	3,581	25,965
1953	366,535	117,236	483,771
1952	284,622	149,107	433,729
1951	281,634	133,160	414,794
1950	282,655	105,425	388,080
1949	192,981	97,955	290,936
1948	167,841	95,819	263,660
1947	167,441	92,590	260,031
1946	91,871	79,657	171,528
1945	1,868	130,928	132,796
1944	......	158,117	158,117

Ward's Automotive Reports. *Estimated.

Bicycles Shipped

1955*	1,700,000	1950	1,950,000
1954	1,500,000	1949	1,600,000
1953	2,000,000	1948	2,750,000
1952	1,910,000	1947	2,750,000
1951	.......1.800,000	1946	1,650,000

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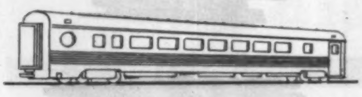
*Estimated.



Railroad Passenger Car Shipments

Number of Cars

	1955	1954	1953	1952	1951
Jan.	40	29	15	8	26
Feb.	36	40	17	21	19
Mar.	45	59	39	4	26
Apr.	36	64	37	12	29
May	49	41	27	2	23
June	55	44	26	13	38
July	39	65	37	8	19
Aug.	45	52	42	5	14
Sept.	355	42	34	13	25
Oct.	206	38	46	11	22
Nov.	...	54	44	11	45
Dec.	...	57	27	20	25

MONTHLY AVERAGES

1954....	49	1948....	79	1942....	36
1953....	33	1947....	74	1941....	30
1952....	11	1946....	114	1940....	24
1951....	26	1945....	78	1939....	23
1950....	80	1944....	84	1938....	36
1949....	84	1943....	59	1937....	52

American Railway Car Institute.

Busses

Shipments from U. S. Factories

	1955	1954	1953	1952
January	190	405	254	778
February	176	328	190	625
March	325	348	236	569
April	519	379	145	597
May	313	323	367	423
June	309	351	380	484
July	296	245	376	224
August	434	309	447	349
September	223	326	348	387
October	469	372	519	389
November	...	305	371	319
December	...	427	424	231
Total	...	4,188	4,057	5,375

YEARLY TOTALS

1951..........	9,460	1946..........	10,091
1950..........	4,908	1945..........	9,500
1949..........	5,511	1944..........	5,799
1948..........	12,299	1943..........	1,613
1947..........	19,110	1942..........	8,337

Automobile Manufacturers Association.

New Transit Equipment Delivered

	Surface Cars	Subway & Elevated Cars	Trolley Coaches	Motor Busses	Total
1955*....	0	48	0	2,100	2,148
1954.....	0	260	0	2,225	2,485
1953.....	0	0	0	2,246	2,246
1952.....	19	0	224	1,749	1,992
1951.....	56	140	600	4,552	5,348
1950.....	4	199	179	2,668	3,050
1949.....	272	415	680	3,358	4,726
1948.....	478	248	1,430	7,009	9,165
1947.....	626	2	955	12,029	13,612
1946.....	421	0	266	6,463	7,150
1945.....	332	0	161	4,441	4,934
1944.....	284	0	60	3.807	4,151

* Estimated.
American Transit Association.

Batteries Shipped

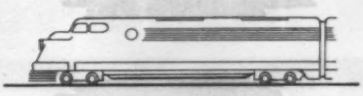
Automotive Replacement Only—Thousands

	1955	1954	1953	1952	1951	1950
Jan.	1,478	1,788	1,571	1,639	1,979	1,551
Feb.	1,647	1,422	1,162	963	1,469	1,240
Mar.	1,321	1,194	1,202	769	1,176	1,259
Apr.	1,281	1,150	1,245	850	1,892	967
May	1,572	1,391	1,455	1,137	1,480	1,264
June	1,794	1,834	2,004	1,535	1,443	1,739
July	2,024	2,288	2,528	2,526	1,705	2,177
Aug.	2,777	2,481	2,707	2,905	2,239	3,000
Sept.	3,045	2,728	2,852	2,874	2,172	3,091
Oct.	....	2,667	2,825	3,112	2,640	3,178
Nov.	....	2,410	2,173	2,168	2,232	2,680
Dec.	....	1,796	1,890	1,975	1,792	2,296
Totals	....	23,149	23,614	22,543	22,219	24,442

YEARLY TOTALS

1949	19,383	1948	23,725

U. S. Department of Commerce.



New Locomotive Units Put in Service by Class 1 Railroads

	Diesel-Electric	Gas-Turbine-Electric	Total
1955			
10 Mos.	884	10	894
January	121	0	121
February	100	0	100
March	82	3	85
April	105	2	107
May	101	2	103
June	81	2	83
July	70	1	71
August	31	0	31
September	85	0	85
October	108	0	108
November	...	..	...
December	...	..	...
1954			
January	159	0	159
February	80	0	80
March	181	1	182
April	136	1	137
May	128	2	130
June	97	3	100
July	51	3	54
August	34	2	36
September	73	2	75
October	32	1	33
November	37	0	37
December	89	1†	90

YEARLY TOTALS

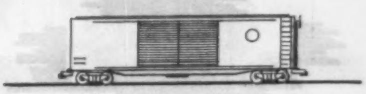
1954	1,097	16	1,113
1953	2,091	4	2,110
1952	3,038	8‡	3,065

Note: Yearly totals include 15 steam units added in 1953 and 19 units in 1952.

†Steam-turbine-electric.

‡Includes 2 electric units.

Association of American Railroads.



Freight Cars Ordered

Domestic

	Car Builders	Railroad Shops	Total No. Cars
1955			
10 Mos.	46,357	29.984	76,341
Jan.	2,749	2,338	5,087
Feb.	770	1,906	2,676
Mar.	1,704	452	2,156
Apr.	1,185	1,517	2,702
May	2,138	773	2,911
June	10,231	3,095	13,326
July	9,613	8,394	18,007
Aug.	9,255	4,150	13,405
Sept.	2,518	710	3,228
Oct.	6,194	6,649	12,843
Nov.	....	.....	.....
Dec.	....	.....	.....
1954	14,240	7,736	21,976
Jan.	442	1.650	2,092
Feb.	2,047	10	2,057
Mar.	250	97	347
Apr.	540	365	905
May	845	313	1.158
June	957	129	1,086
July	518	50	568
Aug.	2,418	7	2,425
Sept.	1,476	920	2,396
Oct.	1,104	1.400	2,504
Nov.	2,586	1,168	3,754
Dec.	1,057	1.627	2.684

YEARLY TOTALS

1953	23,444	10,136	33,580
1952	22,672	11,697	34,369
1951	56,112	36,119	92,231
1950	109,576	46,156	155,732
1949	4,273	1.950	6.223

American Railway Car Institute.

FREIGHT CAR SHIPMENTS

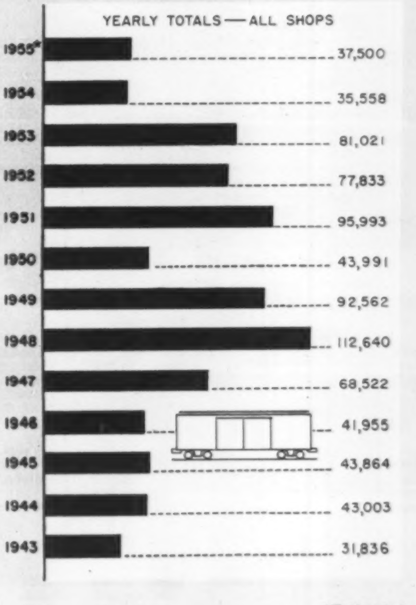
Domestic—Number of Cars

	Car-Builders	Railroad Shops	Total No. Cars
1955			
10 Mos. .	18,760	10,950	29,710
Jan. ..	1,605	409	2,014
Feb. ..	1,913	540	2,453
Mar. .	2,068	765	2,833
Apr. .	1,664	1,086	2,750
May ..	2,438	1,645	4,083
June .	1,690	1,325	3,015
July ..	1,284	908	2,192
Aug. .	1,935	1,545	3,480
Sept. .	1,708	1,410	3.118
Oct. ..	2,455	1,317	3.772
Nov. .	....	....	....
Dec. ..	....	....	....
1954 ...	22,318	13,378	35,696
Jan. ..	3,658	1,286	4,944
Feb. ..	3,022	1,027	4,049
Mar. .	3,793	1,030	4,823
Apr. ..	2,981	1,057	4,038
May .	2,028	1,145	3,173
June ..	1,230	1,420	2,650
July ..	705	1,096	1,801
Aug. .	837	1,460	2,297
Sept. .	1,208	1,358	2,566
Oct. ..	807	1,010	1,817
Nov. .	672	685	1,357
Dec. .	1.377	804	2,181

YEARLY TOTALS

1953 ...	53,298	27,723	81,021
1952	53,587	24.246	77,833
1951	67,744	28,249	95,993
1950	24,443	19,548	43,991
1949	62,955	29.706	92,562

American Railway Car Institute.



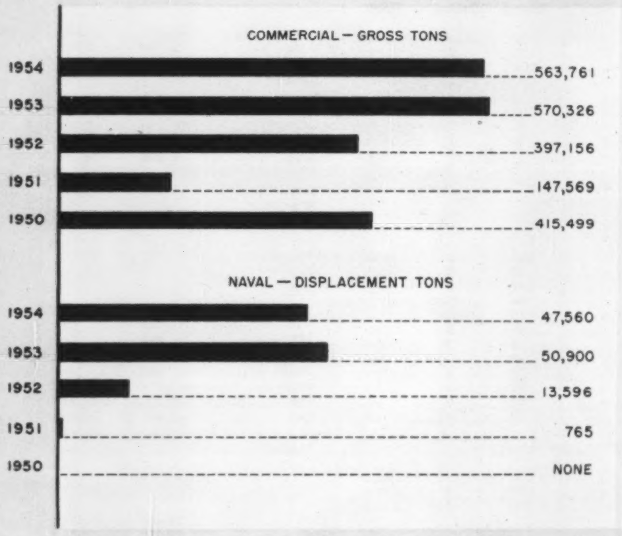
*Estimated.

Transportation

METALWORKING FACTS AND FIGURES

SHIPS DELIVERED FROM PRIVATE YARDS

(UNITED STATES)



Shipbuilding in Private Yards of U. S.

(Steel vessels of 1000 gross tons or more)

	1954		1953	
COMMERCIAL VESSELS	**Number**	**Tons†**	**Number**	**Tons†**
Under construction Jan. 1	47	670,452‡	92	1,297,886
Suspended during year	1	18,735	3	67,366
Contracted for during year	7	122,360	4	19,385
Total	53	774,077	93	1,249,905
Launched during year	31	472,871	41	515,936
Delivered during year	38	563,761	45	570,326
Under construction Dec. 31	15	210,316	48	679,579
NAVAL VESSELS				
Under construction Jan. 1	31	211,980‡	45	253,560
Contracted for during year	26	138,420	2	15,900
Total	57	350,400	47	269,460
Launched during year	14	131,520	16	40,820
Delivered during year	13	47,560	16	50,900
Under construction Dec. 31	44	302,840	31	218,560

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†Gross tons for commercial vessels and displacement tons for naval vessels.
‡Revised.
Shipbuilders Council of America.

Civil Aircraft

Complete Airplanes Shipped

	Number		Value (Thousands)	
	1955	1954	1955	1954
January	350	278	$23,337	$24,302
February	357	240	26,041	36,830
March	478	312	27,761	23,276
April	438	359	17,675	35,883
May	486	309	31,795	26,554
June	538	316	34,072	31,709
July	354	293	28,804	23,895
August	241	265	24,386	18,721
September	341	265	18,525	26,336
October	...	174	.....	16,849
November	...	288	.....	18,589
December	...	290	.....	12.794

YEARLY TOTALS

	Number	Value
1954	3,389	$295,738,000
1953	4,134	244,418,000
1952	3,509	197,151,000

U. S. Bureau of the Census.

Engines for Civil Aircraft

Shipments

	Number		Value (Thousands)	
	1955	1954	1955	1954
January	626	383	$5,996	$4,840
February	626	434	6,115	5,952
March	680	465	6,319	5,089
April	657	546	5,169	5,273
May	704	498	4,780	5,323
June	706	486	4,329	4,787
July	522	442	4,146	4,845
August	464	327	3,177	4,650
September	577	371	3,807	3,352
October	...	488	....	4,811
November	...	537	....	5,389
December	...	542	....	6,336

YEARLY TOTALS

	Number	Value
1954	5,519	$60,647
1953	6,647	70,854
1952	5,382	40.722

U. S. Bureau of the Census.

Commercial Ship Construction

Steel self-propelled vessels of 2000 gross tons and over built in private U. S. yards.†

Year	No.	Gross Tonnage	Year	No.	Gross Tonnage
1954	38	563,761	1948	29	164,482
1953	45	570,326	1947	50	286,473
1952	31	397,156	1946	88	672,554
1951	10	147,569	1945	1,067	7,663,362
1950	26	415,499	1944	1,463	11,404,404
1949	34	538,873	1943	1,661	12,499,873

TYPES OF VESSELS CONSTRUCTED—1954

Type	Number	Gross Tonnage
Tanker	26	456,091
Cargo	10	92,140
Bulk Ore Carrier	1	14,035
Passenger-Auto Ferry	1	1,495
Total	38	563,761

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†On Jan. 1, 1955, 15 steel vessels of 1000 gross tons or over aggregating 210,316 gross tons were under construction, compared with 48 vessels aggregating 679,579 gross tons on Jan. 1, 1954.

CONTRACTED FOR IN 1954

(Vessels of 1000 Gross Tons or Over)

Type	Number	Gross Tonnage
Tanker	7	122,360

UNCOMPLETED VESSELS

Jan. 1, 1955

Type	Number	Gross Tonnage
C-4 Cargo	4	36,856
Tanker	10	161,460
Bulk (Self-Unloader)	1	12,000
Total	15	210.316

Naval Shipbuilding

PRIVATE YARDS' NAVAL BACKLOG

Jan. 1, 1955

Type	Number	Displacement Tonnage
Aircraft Carrier	2	109,200
Destroyer	11	29,260
Destroyer Escort	11	14,740
Submarine	3	7,860
Landing Ship, Dock	6	41,280
Oiler	5	58,000
Store Ship	2	15,900
Ice Breaker	1	5,100
Inshore Fire Support Ship	1	1,500
Ammunition Ship	2	20,000
Total	44	302,840

CONTRACTED FOR IN 1954

Attack Aircraft Carrier	1	54,600
Destroyer	8	21,280
Destroyer Escort	10	13,400
Submarine	1	1,620
Ammunition Ship	2	20,000
Landing Ship, Dock	4	27,520
Total	26	138,420

DELIVERED IN 1954

Escort Vessel	2	2,680
Destroyer Leader	2	6,960
Oiler	1	11,600
Landing Ship, Tank	4	9,760
Submarine	2	2,800
Landing Ship, Dock	2	13,760
Total	13	47.560

Shipbuilders Council of America.

Farm Equipment

METALWORKING FACTS AND FIGURES

FARM MACHINERY AND EQUIPMENT

Manufacturers' Shipments in Thousands

(Except Tractors)

	Total	Domestic	Export
1953	$1,003,264	$908,705	$94,559
1952	1,104,054	1,012,553	91,501
1951	1,218,966	1,123,918	95,048
1950	1,795,394	1,564,918	230,476
1949	1,813,008	1,550,934	262,074
1948	1,733,746	1,513,613	220,133
1947	1,294,686	1,132,686	162,000
1946	850,478	763,231	87,247

Plows and Listers

	Total	Domestic	Export
1953	$68,703	$59,252	$9,451
1952	92,632	80,058	12,574
1951	111,512	96,013	15,499
1950	99,958	86,111	13,847
1949	99,974	82,387	17,587
1948	100,605	87,570	13,035
1947	83,529	73,545	9,984
1946	50,694	45,815	4,879

Harrows, Rollers, Pulverizers, Stalk Cutters

1953	$78,785	$73,011	$5,774
1952	84,558	78,310	6,248
1951	94,188	86,922	7,266
1950	77,706	70,756	6,950
1949	76,860	69,798	7,062
1948	80,954	76,748	4,206
1947	57,423	51,951	5,472
1946	36,634	34,965	1,669

Planting, Seeding and Fertilizing Machinery

1953	$107,443	$103,148	$4,295
1952	127,366	121,635	5,731
1951	134,062	127,192	6,870
1950	113,053	107,468	5,585
1949	114,875	109,371	5,504
1948	109,505	104,923	4,582
1947	73,977	69,945	4,032
1946	53,838	52,089	1,749

Cultivators and Weeders

1953	$54,829	$51,665	$3,164
1952	71,605	67,725	3,880
1951	80,983	75,987	4,996
1950	57,082	52,866	4,216
1949	70,169	65,221	4,948
1948	80,069	75,222	4,847
1947	50,363	47,429	2,934
1946	33,942	32,425	1,517

Sprayers and Dusters

1953	$34,701	$31,416	$3,285
1952	36,429	32,288	4,141
1951	42,530	37,718	4,812
1950	36,959	32,059	4,900
1949	32,159	28,324	3,835
1948	44,458	39,104	5,354
1947	39,556	35,323	4,233
1946	26,280	23,983	2,297

Harvesting Machinery

1953	$294,024	$248,001	$46,023
1952	309,384	272,329	37,055
1951	345,084	313,077	32,007
1950	288,153	263,417	24,736
1949	290,555	265,974	24,581
1948	247,820	226,446	21,374
1947	191,570	174,682	16,888
1946	113,725	105,942	7,783

Haying Machinery

1953	$191,441	$179,071	$12,370
1952	202,962	191,267	11,695
1951	209,546	196,615	12,931
1950	154,979	146,560	8,419
1949	151,791	140,446	11,345
1948	153,395	142,235	11,160
1947	94,865	87,918	6,947
1946	59,855	56,351	3,504

Machines for Preparing Crops for Market or for Use

	Total	Domestic	Export
1953	$29,919	$25,745	$4,174
1952	31,461	26,878	4,583
1951	36,406	31,178	5,228
1950	30,552	26,255	4,297
1949	35,383	30,751	4,632
1948	42,216	37,052	5,164
1947	42,013	38,136	3,877
1946	36,046	33,542	2,504

Farm Poultry Equipment

1953	$27,216	$25,931	$1,285
1952	25,442	24,556	886
1951	34,611	33,540	1,071
1950	30,127	29,427	700
1949	25,345	24,506	839
1948	20,379	19,523	856
1947	20,602	19,686	916
1946	23,925	23,172	753

Farm Dairy Machines and Equipment

1953	$24,370	$22,818	$1,552
1952	21,471	19,778	1,693
1951	22,310	20,668	1,642
1950	22,969	20,905	2,064
1949	20,057	17,535	2,522
1948	23,443	20,603	2,840
1947	31,415	28,198	3,217
1946	41,553	38,487	3,066

Barn Equipment

1953	$15,107	$14,951	$156
1952	15,526	15,454	72
1951	13,719	13,702	17
1950	11,808	11,783	25
1949	10,050	10,027	23
1948	13,207	13,186	21
1947	11,802	11,794	8
1946	9,554	9,547	7

Farm Wagons, Trucks and Other Farm Transportation Equipment

1953	$26,555	$25,213	$1,342
1952	29,505	28,046	1,459
1951	32,996	31,312	1,684
1950	26,139	24,284	1,855
1949	24,339	22,806	1,533
1948	38,918	36,899	2,019
1947	36,014	33,546	2,468
1946	28,470	27,708	762

Barnyard Equipment

1953	$12,507	$12,439	$68
1952	15,064	15,005	59
1951	21,641	21,574	67
1950	17,777	17,739	38
1949	13,498	13,455	43
1948	10,915	10,885	30
1947	8,808	8,786	22
1946	8,844	8,732	112

Farm Elevators and Blowers

1953	$37,664	$36,044	$1,620
1952	40,649	39,224	1,425
1951	39,378	38,420	958
1950	34,682	33,766	916
1949	32,735	32,241	494
1948	25,311	25,173	138
1947	16,389	16,244	145
1946	10,595	10,541	54

TRACTORS

Manufacturers' Shipments

TOTAL—ALL TYPES

Year	Number	Value (in thousands)
1954†	297,066	$711,185
1953	652,761	948,287
1952	667,824	924,615
1951	777,467	1,042,719
1950	698,344	820,031
1949	720,644	792,881
1948	738,686	689,357
1947	638,451	516,815
1946	396,844	299,132

---

†Except garden type.

WHEEL TYPE
(except garden)

Year	Number	Value (in thousands)
1954	256,692	$443,267
1953	390,366	590,322
1952	417,177	615,676
1951	559,973	758,001
1950	499,917	574,295
1949	545,368	572,430
1948	529,692	497,298
1947	428,665	349,334
1946	255,338	192,272

TRACKLAYING TYPE

Year	Number	Value (in thousands)
1954	40,374	$267,918
1953	50,597	328,696
1952	48,155	280,841
1951	49,142	259,960
1950	44,600	223,487
1949	43,849	199,423
1948	39,573	162,007
1947	37,534	134,330
1946	26,265	82,934

GARDEN TYPE

Year	Number	Value (in thousands)
1954	n.a.	n.a.
1953	211,798	$29,269
1952	202,492	28,098
1951	168,352	24,758
1950	153,827	22,249
1949	131,427	21,028
1948	169,421	30,052
1947	172,252	33,151
1946	115,241	23,926

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n.a.=not available.

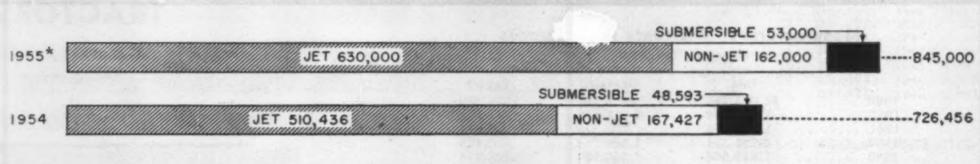
U. S. Bureau of the Census.

Farm Equipment

METALWORKING FACTS AND FIGURES

DOMESTIC WATER SYSTEMS

Factory Shipments



Jet Pump Systems

	Units	Value
1955*	630,000	....
Jan.	37,278	$3,310,000
Feb.	33,167	2,887,000
Mar.	47,625	4,056,000
Apr.	47,919	4,102,000
May	54,550	4,609,000
June	60,150	5,083,000
July	60,115	5,120,000
Aug.	61,446	5,369,000
Sept.	59,915	5,231,000
Oct.	......	....
Nov.	......	....
Dec.	......	....
1954	510,436	$46,278,000
Jan.	30,116	2,808,000
Feb.	34,384	3,116,000
Mar.	40,103	3,618,000
Apr.	47,957	4,288,000
May	46,739	4,196,000
June	49,524	4,486,000
July	53,614	4,863,000
Aug.	55,449	5,065,000
Sept.	53,679	4,776,000
Oct.	42,402	3,838,000
Nov.	31,485	2,937,000
Dec.	24,984	2,287,000
1953	470,271	$43,980,000
1952	432,872	41,769,000
1951	379,652	37,656,000
1950	449,768	38,935,000
1949	293,599	24,313,000

U. S. Bureau of the Census.

Non-Jet Pump Systems

	Units	Value
1955*	162,000	....
Jan.	9,002	$795,000
Feb.	11,346	890,000
Mar.	14,385	1,089,000
Apr.	14,243	1,153,000
May	13,813	1,144,000
June	14,862	1,173,000
July	13,998	1,171,000
Aug.	16,063	1,316,000
Sept.	13,458	1,151,000
Oct.	......	....
Nov.	......	....
Dec.	......	....
1954	167,427	$13,593,000
Jan.	12,188	1,073,000
Feb.	11,948	969,000
Mar.	17,822	1,306,000
Apr.	15,436	1,214,000
May	13,785	1,091,000
June	16,962	1,345,000
July	16,066	1,313,000
Aug.	12,920	1,188,000
Sept.	18,367	1,447,000
Oct.	15,305	1,218,000
Nov.	9,288	759,000
Dec.	7,340	670,000
1953	196,995	$16,630,000
1952	249,145	25,972,000
1951	237,408	22,303,000
1950	272,879	21,269,000
1949	234,365	17,563,000

Submersible Pumps†

	Units	Value
1955*	53,000	....
Jan.	3,099	$769,000
Feb.	3,015	737,000
Mar.	3,557	832,000
Apr.	3,562	805,000
May	4,952	1,095,000
June	5,526	1,272,000
July	5,184	1,147,000
Aug.	6,494	1,298,000
Sept.	6,060	1,210,000
Oct.	.....	....
Nov.	.....	....
Dec.	.....	....
1954	48,593	$12,162,000
Jan.	2,436	607,000
Feb.	2,912	656,000
Mar.	3,142	782,000
Apr.	3,849	901,000
May	4,682	1,092,000
June	4,712	1,084,000
July	4,657	1,254,000
Aug.	5,484	1,477,000
Sept.	5,204	1,391,000
Oct.	4,659	1,199,000
Nov.	3,765	999,000
Dec.	3,091	800,000
1953	34,785	$8,649,000

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†Prior to 1953, submersible pumps were included under non-jet pumps.

*Estimated.

Domestic Hand and Windmill Pumps

Factory Shipments

1955	Units	Value
Jan.	25,348	$131,000
Feb.	18,811	115,000
Mar.	23,894	132,000
Apr.	19,646	156,000
May	19,401	117,000
June	19,346	108,000
July	17,644	112,000
Aug.	16,862	118,000
Sept.	15,560	113,000
1954	226,108	$1,455,000
Jan.	19.013	128,000
Feb.	16,594	109,000
Mar.	27,358	153,000
Apr.	17,109	120,000
May	18,269	119,000
June	15,662	112,000
July	22,421	159,000
Aug.	27,414	166,000
Sept.	20.845	125,000
Oct.	17,774	115.000
Nov.	11,091	71,000
Dec.	12,558	78,000
YEARLY TOTALS		
1953	225,754	$1,667,000
1952	242,636	1,809,000
1951	245,791	1,725,000
1950	334,357	1.941,000
1949	327.415	2,186,000
1948	456.650	2.892,000
1947	368,532	2.322,000
1946	313,023	1,623,000
1945	314,638	1,689.000
1944	380 240	1,955.000
1943	368,249	1.730,000
1942	377.331	1,631,000
1941	490.586	1,896,000
1940	420,941	1,553,000

U. S. Bureau of the Census.

Pump Jacks

Factory Shipments

1955	Units	Value
Jan.	2,821	$78,000
Feb.	1,781	50,000
Mar.	2,071	62,000
Apr.	2,047	57,000
May	2,103	58,000
June	1,932	55,000
July	1,904	57,000
Aug.	3,242	98,000
Sept.	3,147	97,000
1954	27,136	$815,000
Jan.	2,397	67,000
Feb.	2,735	78,000
Mar.	2,309	75,000
Apr.	2,218	69,000
May	1,545	43,000
June	1,783	58,000
July	3,582	108,000
Aug.	3,619	111,000
Sept.	2,399	77,000
Oct.	2,041	57,000
Nov.	1,341	37,000
Dec.	1,167	35,000
YEARLY TOTALS		
1953	29,801	$893,000
1952	31,961	975,000
1951	37,461	1,149,000
1950	43,237	1,187,000
1949	36,854	1,034.000
1948	41,952	1,083,000
1947	54.187	1,450.000
1946	89,460	2.257,000
1945	62,451	1.418,000
1944	56,550	1,230.000
1943	31,065	640 000
1942	55.665	906.000
1941	59,058	856 000
1940	47,842	630,000
1939	37,133	464.000
1938	30,198	362,000

U. S. Bureau of the Census.

Windmill Heads

Factory Shipments

1955	Units	Value
Jan.	534	$55,000
Feb.	694	73,000
Mar.	1,007	108,000
Apr.	1,128	97,000
May	1,197	141,000
June	714	65,000
July	823	85,000
Aug.	993	100,000
Sept.	1,015	111,000
1954	11,289	$1,105,000
Jan.	1,013	99,000
Feb.	786	81,000
Mar.	1,031	101,000
Apr.	984	89,000
May	908	88,000
June	1,454	142,000
July	1,208	113,000
Aug.	784	77,000
Sept.	846	90,000
Oct.	836	91,000
Nov.	763	70,000
Dec.	676	64,000
YEARLY TOTALS		
1953	10,783	$988,000
1952	13,918	1,245,000
1951	16,700	1,498,000
1950	20,736	1,674,000
1949	19,188	1,675,000
1948	31,835	2,183,000
1947	39,076	2,424,000
1946	46.004	2,113,000
1945	41,761	1,786,000
1944	40,540	1,699,000
1943	34,523	1,537.000
1942	37,642	1,624,000
1941	43,159	1,757,000
1940	45,787	1,755,000
1939	52,706	2,100,000
1938	46,455	1,923.000

U. S. Bureau of the Census.

Windmill Towers

Factory Shipments

1955	Units	Value
Jan.	231	$27,000
Feb.	273	33,000
Mar.	409	51,000
Apr.	410	46,000
May	471	56,000
June	367	38,000
July	382	46,000
Aug.	393	46,000
Sept.	352	43,000
1954	4,911	$552,000
Jan.	450	44,000
Feb.	318	32,000
Mar.	493	54,000
Apr.	392	42,000
May	380	45,000
June	555	64,000
July	423	50,000
Aug.	397	46,000
Sept.	415	50,000
Oct.	443	51,000
Nov.	330	38,000
Dec.	315	36,000
YEARLY TOTALS		
1953	5,088	$477,000
1952	6,795	625,000
1951	9.416	832,000
1950	9,092	788,000
1949	9,843	901,000
1948	19,115	1,430,000
1947	22,269	1,351,000
1946	22,416	1,043,000
1945	20,603	863.000
1944	18,236	727,000
1943	11,632	480.000
1942	11,373	468,000
1941	14,950	670,000
1940	14,647	641,000
1939	17,418	808,000
1938	16,898	662,000

U. S. Bureau of the Census.

Business Indexes

METALWORKING FACTS AND FIGURES

INDEXES OF INDUSTRIAL PRODUCTION

FEDERAL RESERVE BOARD—1947-1949 — 100

Total Industrial Production

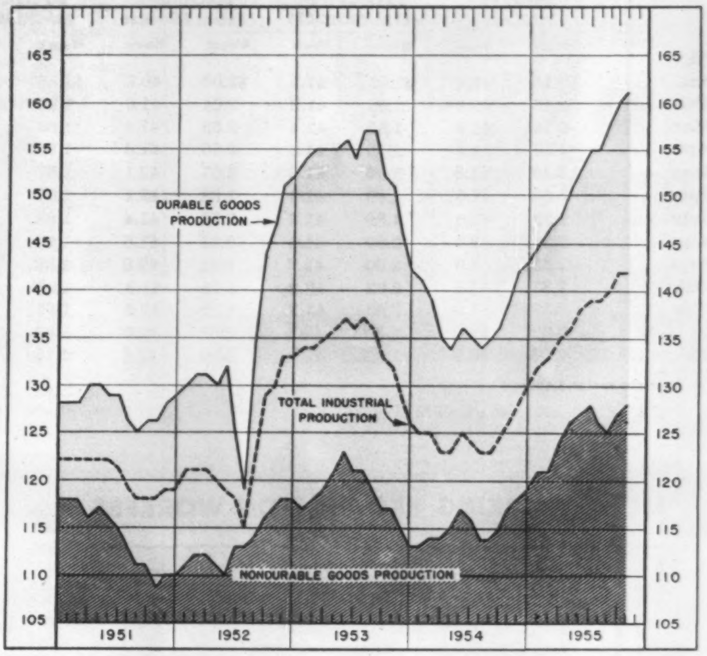
Adjusted for Seasonal Variation

	1955	1954	1953	1952	1951
Jan.	132	125	134	121	122
Feb.	133	125	134	121	122
Mar.	135	123	135	121	122
Apr.	136	123	136	120	122
May	138	125	137	119	122
June	139	124	136	118	121
July	139	123	137	115	119
Aug.	140	123	136	123	118
Sept.	142	124	133	129	118
Oct.	142	126	132	130	118
Nov.	...	128	129	133	119
Dec.	...	130	126	133	119

YEARLY INDEXES

1955* ...	138	1950 ...	112	1945 ...	107
1954 ...	125	1949 ...	97	1944 ...	125
1953 ...	134	1948 ...	104	1943 ...	127
1952 ...	124	1947 ...	100	1942 ...	106
1951 ...	120	1946 ...	90	1941 ...	87

*Estimated.



Primary Metals

Adjusted for Seasonal Variation

	1955	1954	1953	1952	1951
Jan.	127	111	135	125	124
Feb.	131	109	137	125	123
Mar.	136	103	136	125	125
Apr.	138	103	136	116	128
May	140	106	139	116	128
June	143	108	137	63	129
July	134	103	136	56	128
Aug.	139	105	137	126	128
Sept.	145	105	130	132	126
Oct.	146	111	128	134	125
Nov.	...	118	122	136	124
Dec.	...	121	113	135	125

Metal Fabricating

Adjusted for Seasonal Variation

	1955	1954	1953	1952	1951
Jan.	155	155	168	137	129
Feb.	157	151	168	138	131
Mar.	157	147	168	139	132
Apr.	160	147	169	139	132
May	162	148	169	142	132
June	163	147	168	143	131
July	167	147	171	134	128
Aug.	169	148	171	142	127
Sept.	171	149	166	154	130
Oct.	173	150	166	159	132
Nov.	...	152	159	164	134
Dec.	...	154	156	166	136

Durable Goods

Adjusted for Seasonal Variation

	1955	1954	1953	1952	1951
Jan.	145	141	154	130	128
Feb. ...	147	139	155	131	128
Mar.	148	135	155	131	130
Apr.	151	134	155	130	130
May	153	136	156	132	129
June	155	135	154	125	129
July	155	134	157	119	126
Aug.	158	135	157	135	125
Sept.	160	137	152	144	126
Oct.	161	139	151	147	126
Nov.	...	142	146	151	128
Dec.	...	143	142	152	129

Nondurable Goods

Adjusted for Seasonal Variation

	1955	1954	1953	1952	1951
Jan.	121	113	117	111	118
Feb.	121	114	118	112	118
Mar.	124	114	119	112	116
Apr.	126	115	121	111	117
May	127	117	123	110	116
June	128	116	121	113	115
July	126	114	121	113	113
Aug.	125	114	119	114	111
Sept.	127	115	117	116	111
Oct.	128	117	117	117	109
Nov.	...	118	115	118	110
Dec.	...	119	112	118	110

Consumers' Price Index

Cost of Living. 1947-1949=100

	1955	1954	1953	1952
January	114.3	115.2	113.9	113.1
February ...	114.3	115.0	113.4	112.4
March	114.3	114.8	113.6	112.4
April	114.2	114.6	113.7	112.9
May	114.2	115.0	114.0	113.0
June	114.4	115.1	114.5	113.4
July	114.7	115.2	114.7	114.1
August	114.5	115.0	115.0	114.3
September ..	114.9	114.7	115.2	114.1
October	114.9	114.5	115.4	114.2
November ...	....	114.6	115.0	114.3
December ...	....	114.3	114.9	114.1

MONTHLY AVERAGES

1955*......	114.6	1953	114.4
1954	114.8	1952	113.5

*Estimated.
U. S. Bureau of Labor Statistics.

Wholesale Price Indexes

1947-1949=100

ALL COMMODITIES

	1955	1954
January	110.1	110.9
February	110.4	110.5
March	110.0	110.5
April	110.5	111.0
May	109.9	110.9
June	110.3	110.0
July	110.5	110.4
August	110.9	110.5
September	111.7	110.0
October	111.5	109.7
November	....	110.0
December	....	109.5

U. S. Bureau of Labor Statistics.

ALL COMMODITIES OTHER THAN FARM PRODUCTS AND FOOD

	1955	1954
January	115.2	114.6
February	115.7	114.4
March	115.6	114.2
April	115.7	114.5
May	115.5	114.5
June	115.6	114.2
July	116.5	114.3
August	117.5	114.4
September	118.5	114.4
October	119.0	114.5
November	....	114.8
December	....	114.9

Labor

METALWORKING FACTS AND FIGURES

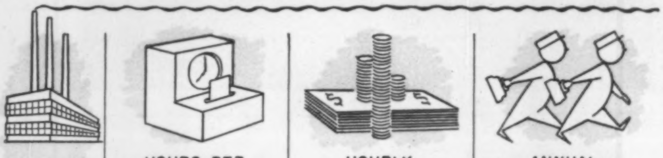
METALWORKING WAGES & HOURS (Production Workers)

(Average Hourly Wages and Average Weekly Hours)

	PRIMARY METALS		FABRICATED METAL PRODUCTS		MACHINERY Except Electrical		ELECTRICAL MACHINERY		TRANSPORTATION EQUIPMENT		INSTRUMENTS Related Products	
	Wages	Hours	Wages	Hours	Wages	Hours	Wages	Hours	Wages	Hours	Wages	Hours
1955												
Jan.	$2.16	40.4	$1.95	41.1	$2.03	40.8	$1.85	40.3	$2.20	42.1	$1.87	40.2
Feb.	2.15	40.6	1.95	41.2	2.04	41.0	1.85	40.4	2.20	42.4	1.88	40.5
Mar.	2.16	40.9	1.95	41.4	2.05	41.4	1.86	40.5	2.21	42.7	1.88	40.5
Apr.	2.17	41.2	1.95	41.2	2.06	41.6	1.86	40.6	2.20	42.1	1.88	40.3
May	2.18	41.6	1.96	41.6	2.07	42.1	1.87	40.8	2.22	42.7	1.87	40.6
June	2.20	41.5	1.96	41.3	2.08	42.1	1.87	40.6	2.19	40.3	1.91	40.8
July	2.28	40.6	1.99	41.2	2.08	41.4	1.88	39.8	2.23	41.7	1.90	40.2
Aug.	2.27	40.7	2.00	41.6	2.08	41.5	1.88	40.6	2.24	40.9	1.91	40.4
Sept.	2.33	41.9	2.00	41.7	2.11	42.0	1.89	40.3	2.26	41.4	1.93	41.2
Oct.	2.31	41.6	2.02	42.2	2.13	42.3	1.90	41.3	2.28	41.1	1.94	41.5
Nov.	2.32	41.9	2.03	41.8	2.15	42.6	1.90	41.4	2.30	42.5	1.93	40.9
1954 (Av.)	2.09	38.7	1.90	40.7	2.01	40.6	1.82	39.8	2.14	40.5	1.83	40.0
1953 (Av.)	2.06	40.9	1.85	41.7	1.96	42.3	1.76	40.8	2.07	41.2	1.78	41.4

U. S. Department of Labor.

METALWORKING PRODUCTION WORKERS



	HOURS PER WEEK (average)	HOURLY EARNINGS (average)	ANNUAL EMPLOYMENT (average)
1955*	41.3 HOURS	$2.05	5,566,000
1954	40.0 HOURS	$1.96	5,328,700
1953	41.4 HOURS	$1.91	6,076,200

METALWORKING EMPLOYMENT

(All Wage and Salary Workers, in Thousands)

	TOTAL	Primary Metals	Fabricated Metal Products	Machinery Except Electrical	Electrical Machinery	Transportation Equip.	Instruments etc.
1955							
Jan.	6,969.1	1,202.5	1,043.0	1,506.0	1,093.2	1,815.7	308.7
Feb.	7,049.5	1,224.9	1,051.5	1,523.4	1,096.3	1,844.5	308.9
Mar.	7,141.6	1,251.6	1,067.5	1,544.7	1,098.3	1,868.5	311.0
Apr.	7,215.0	1,273.6	1,077.5	1,568.0	1,101.8	1,883.7	310.4
May	7,257.3	1,294.5	1,087.8	1,580.5	1,108.9	1,880.6	305.0
June	7,316.7	1,316.4	1,096.5	1,593.6	1,118.6	1,876.5	315.1
July	7,231.6	1,302.7	1,077.5	1,573.5	1,108.2	1,854.9	314.8
Aug.	7,240.3	1,318.8	1,092.1	1,572.2	1,126.4	1,815.3	315.5
Sept.	7,287.7	1,341.1	1,110.0	1,563.8	1,163.3	1,791.2	318.3
Oct.	7,395.6	1,342.4	1,119.4	1,612.5	1,192.3	1,806.2	322.8
Nov.	7,574.4	1,353.7	1,134.0	1,642.7	1,178.5	1,942.2	323.3
1954 (Av.)	6,930.5	1,185.0	1,045.2	1,551.1	1,088.6	1,744.9	315.7
1953 (Av.)	7,687.1	1,332.7	1,139.3	1,707.9	1,219.8	1,952.6	334.8

U. S. Department of Labor. *Estimated.

Steel Industry's Minimum Labor Rates

	Hourly wage (cents)	Per cent over 1915
1915	20.0	....
February 1, 1916	22.0	10.0
May 1, 1916	25.0	25.0
December 15, 1916	27.5	37.5
May 1, 1917	30.0	50.0
October 1, 1917	33.0	65.0
April 16, 1918	38.0	90.0
August 1, 1918	42.0	110.0
October 1, 1918	46.2	131.0
February 1, 1920	50.6	153.0
May 16, 1921	40.5	102.5
July 16, 1921	37.0	85.0
August 29, 1921	30.0	50.0
September 1, 1922	36.0	80.0
April 16, 1923	40.0	100.0
August, 1923	44.0	120.0
October 1, 1931	39.6	98.0
May 16, 1932	33.7	68.5
August 19, 1933 (NRA)	40.0	100.0
April 1, 1934	44.0	120.0
November, 1936	52.5	162.5
March, 1937	62.5	212.5
April, 1941	72.5	262.5
July, 1942	78.0	290.0
February, 1946	96.5	382.5
April, 1947	109.0	445.0
July 16, 1948	118.5	492.5
December 1, 1950	131.0	555.0
March 1, 1952	143.5	617.5
June 12, 1953	152.0	660.0
July 1, 1954	157.0	685.0
July 1, 1955	168.5	742.5

Compiled by STEEL.

Work Stoppages

1955	Number of Stoppages in Effect	Workers Involved	Man-Days Lost
10 Mos.	5,430	3,725,000	22,770,000
Jan.	325	80,000	400,000
Feb.	380	125,000	570,000
Mar.	450	220,000	1,600,000
Apr.	500	310,000	2,600,000
May	575	310,000	2,600,000
June	700	650,000	3,400,000
July	650	900,000	3,200,000
Aug.	650	380,000	3,000,000
Sept.	600	430,000	2,800,000
Oct.	600	320,000	2,600,000
	Number of Stoppages Started	Workers Involved	Man-Days Lost
1954	3,468	1,530,000	22,600,000

U. S. Department of Labor.

Steel Employment, Wages, Hours and Payrolls

1955 By Months

	Number Employees (Wage and salaried workers)	Av. Hrly. Earnings (Hourly, piecework or tonnage wages)	Av. Hrs. per Week (Hourly, piecework or tonnage wages)	Total Payrolls (Wages and salaries)
Jan.	605,100	$2.387	37.8	$258,824,000
Feb.	616,400	2.406	40.0	255,130,000
Mar.	629,900	2.385	41.1	288,229,000
Apr.	643,200	2.407	39.9	282,025,000
May	654,000	2.404	39.7	294,073,000
June	667,100	2.420	40.1	298,439,000
July	676,400	2.598	35.0	296,857,000
Aug.	679,900	2.572	38.9	320,730,000
Sept.	680,200	2.602	39.5	317,106,000
Oct.	......	....	...	....
Nov.	......	....	...	....
Dec.	......	....	...	....

1954 By Months

Jan.	644,900	$2.294	35.7	$251,288,000
Feb.	636,100	2.299	37.2	236,574,000
Mar.	620,500	2.278	37.3	249,672,000
Apr.	609,400	2.296	35.8	232,638,000
May	606,400	2.314	34.9	234,413,000
June	608,900	2.315	36.0	236,406,000
July	607,600	2.368	33.4	232,796,000
Aug.	601,400	2.356	35.1	238,778,000
Sept.	597,400	2.368	35.7	234,595,000
Oct.	596,100	2.364	36.6	244,698,000
Nov.	598,800	2.391	37.6	247,722,000
Dec.	604,600	2.372	38.0	262,189,000

1953 By Months

Jan.	683,800	$2.216	40.7	$285,361,000
Feb.	684,900	2.208	40.7	261,272,000
Mar.	683,100	2.206	40.3	281,421,000
Apr.	685,000	2.203	41.0	278,324,000
May	685,300	2.222	39.9	280,953,000
June	690,200	2.263	39.9	282,127,000
July	696,000	2.310	38.1	288,052,000
Aug.	695,600	2.318	38.2	287,253,000
Sept.	687,800	2.328	39.2	283,773,000
Oct.	678,200	2.307	40.1	290,583,000
Nov.	667,400	2.323	38.0	268,523,000
Dec.	655,803	2.279	37.0	263,944,000

1952 By Months

Jan.	672,100	$1.958	41.4	$252,236,000
Feb.	674,000	1.942	40.9	234,864,000
Mar.	672,100	1.950	39.8	242,731,000
Apr.	669,600	1.938	37.7	225,568,000
May	662,600	1.971	36.1	223,148,000
June	a.	a.	a.	a.
July	a.	a.	a.	a.
Aug.	659,800	2.139	38.2	250,361,000
Sept.	673,600	2.206	40.3	269,391,000
Oct.	676,800	2.161	41.8	282,896,000
Nov.	680,300	2.218	39.6	269,709,000
Dec.	684,400	2.211	39.5	280,046,000

MONTHLY AVERAGES AND TOTAL PAYROLLS

1954	611,008	$2.335	36.1	$2,901,769,009
1953	682,758	2.265	39.4	3,351,586,000
1952†	672,530	2.069	39.5	2,530,950,000
1951	670,717	1.945	40.2	2,881,170,000
1950	635,500	1.746	39.0	2,389,759,000
1949	620,500	1.703	34.5	2,061,770,000
1948	635,600	1.630	39.1	2,234,461,000
1947	616,300	1.513	38.6	1,986,600,000
1946	575,300	1.347	35.1	1,544,142,000
1945	551,200	1.248	44.2	1,645,332,700
1944	571,200	1.219	46.7	1,745,019,700
1943	625,700	1.135	43.0	1,649,227,000
1942	647,200	1,056	38.9	1,467,058,700
1941	633,000	.959	38.6	1,301,347,800
1940	546,800	.850	36.2	960,779,300

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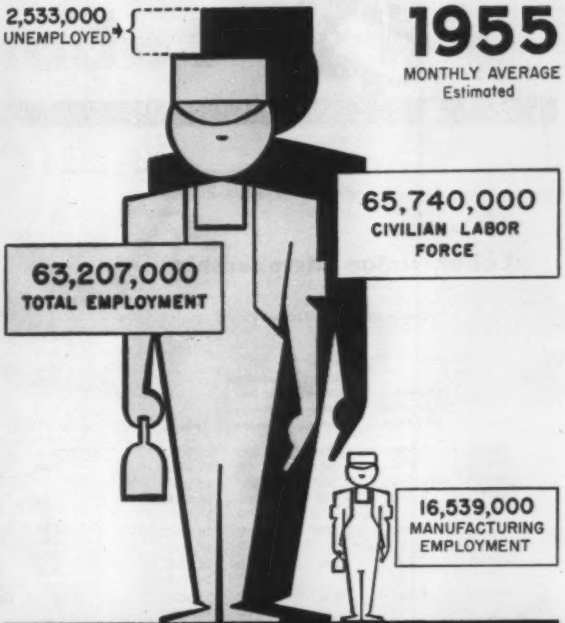
a. =No reports issued because of steelworkers' strike.
†10 Months.
American Iron & Steel Institute.



TOTAL U.S. EMPLOYMENT

(In Thousands)

1955 By Months

	Civilian Labor Force	Total Employ-ment	Un-employ-ment	Mfg. Employ-ment
Jan.	63,497	60,150	3,347	15,925
Feb.	63,321	59,938	3,383	16,060
Mar.	63,654	60,477	3,176	16,201
Apr.	64,647	61,685	2,962	16,255
May	65,192	62,703	2,489	16,334
June	66,696	64,016	2,679	16,577
July	67,465	64,994	2,471	16,475
Aug.	67,726	65,488	2,237	16,807
Sept.	66,882	64,733	2,149	16,916
Oct.	67,292	65,161	2,131	16,985
Nov.	67,206	64,807	2,398	17,084
Dec.	.....	.....	....	.....

1954 By Months

Jan.	62,840	59,753	3,087	16,380
Feb.	63,725	60,055	3,670	16,265
Mar.	63,825	60,100	3,724	16,170
Apr.	64,063	60,598	3,465	15,948
May	64,425	61,119	3,305	15,781
June	65,445	62,098	3,347	15,835
July	65,494	62,148	3,347	15,584
Aug.	65,522	62,277	3,245	15,822
Sept.	65,244	62,145	3,100	15,972
Oct.	64,882	62,141	2,741	16,007
Nov.	64,624	61,732	2,893	16,057
Dec.	63,526	60,688	2,838	16,050
1954 Av...	64,468	61,238	3,230	15,989

1953 By Months

Jan.	62,896	61,004	1,892	17,083
Feb.	62,885	61,097	1,788	17,225
Mar.	63,339	61,665	1,674	17,359
Apr.	63,155	61,573	1,582	17,307
May	63,285	61,979	1,306	17,274
June	65,147	63,585	1,562	17,403
July	65,214	63,666	1,548	17,318
Aug.	64,931	63,691	1,240	17,505
Sept.	63,905	62,584	1,321	17,475
Oct.	64,059	62,758	1,301	17,259
Nov.	67,495	62,276	1,699	16,939
Dec.	66,485	60,680	2,313	16,713
1953 Av...	64,400	62,213	1,602	17,238

MONTHLY AVERAGES

1952	62,966	61,293	1,673	16,209
1951	62,884	61,005	1,879	16,082
1950	63,099	59,957	3,142	14,967
1949	62,105	58,710	3,395	14,178
1948	61,442	59,378	2,064	15,321
1947	60,168	58,027	2,142	15,290
1946	57,520	55,250	2,270	14,461
1945	53,860	52,820	1,040	15,302
1944	54,630	53,960	670	17,111
1943	55,540	54,470	1,070	17,381
1942	56,410	53,750	2,660	15,051
1941	55,910	50,350	5,560	12,974
1940	55,640	47,520	8,120	10,780

U. S. Department of Labor.
U. S. Department of Commerce.

Labor

METALWORKING FACTS AND FIGURES

Labor Union Membership

Thousands of Members

Year	American Federation of Labor	Congress of Industrial Organizations	Independent or Unaffiliated Unions	Total
1955* ...	10,900	5,200	1,800	17,900
1954	10,900	5,200	1,800	17,900
1953* ...	10,900	5,200	1,800	17,900
1952* ...	9,500	5,000	2,000–2,500	16,500–17,000
1951	9,500	5,000	2,000–2,500	16,500–17,000
1950	7,143	n.a.	2,400–2,800	14,000–16,000
1949	7,241	n.a.	2,000–2,300	14,000–16,000
1948	7,221	n.a.	2,200–2,500	14,000–16,000
1947	7,578	6,000	1,836	15,414
1946	7,152	6,000	1,822	14,974
1945	6,931	6,000	1,865	14,796
1944	6,807	5,935	1,879	14,621
1943	6,564	5,285	1,793	13,642
1942	5,483	4,195	1,084	10,762
1941	4,569	5,000	920	10,489
1940	4,247	3,625	1,072	8,944
1939	4,006	4,000	974	8,980
1938	3,623	4,038	604	8,265
1937	2,861	3,718	639	7,218
1936	3,422	....	742	4,164
1935	3,045	....	683	3,728
1934	2,608	....	641	3,249
1933	2,127	....	730	2,857
1932	2,532	....	694	3,226
1931	2,890	....	636	3,526
1930	2,961	....	671	3,632
1929	2,934	....	691	3,625
1928	2,896	....	671	3,567
1927	2,813	....	787	3,600
1926	2,804	....	788	3,592
1925	2,877	....	689	3,566
1924	2,866	....	683	3,549
1923	2,926	....	703	3,629
1922	3,196	....	754	3,950
1921	3,907	....	815	4,722
1920	4,079	....	955	5,034
1919	3,260	....	786	4,046
1918	2,726	....	642	3,368
1917	2,371	....	605	2,976
1916	2,073	....	649	2,722
1915	1,946	....	614	2,560
1914	2,021	....	626	2,647
1913	1,996	....	665	2,661
1912	1,770	....	635	2,405
1911	1,762	....	556	2,318
1910	1,562	....	554	2,116
1909	1,483	....	482	1,965
1908	1,587	....	505	2,092
1907	1,539	....	538	2,077
1906	1,454	....	438	1,892
1905	1,494	....	424	1,918
1904	1,676	....	391	2,067
1903	1,466	....	358	1,824
1902	1,024	....	311	1,335
1901	788	....	270	1,058
1900	548	....	243	791
1899	349	....	201	550

*Estimated by STEEL.

n.a.=not available.

U. S. Department of Labor.

Labor Turn-Over

Rates Per 100 Employees in Manufacturing Industries

SEPARATIONS

	Quit		Discharge		Lay-Off		Miscellaneous		Total	
	1955	1954	1955	1954	1955	1954	1955	1954	1955	1954
Jan.	1.0	1.1	0.2	0.2	1.5	2.8	0.3	0.3	2.9	4.3
Feb.	1.0	1.0	0.2	0.2	1.1	2.2	0.2	0.2	2.5	3.5
Mar.	1.3	1.0	0.2	0.2	1.3	2.3	0.2	0.2	3.0	3.7
Apr.	1.5	1.1	0.3	0.2	1.2	2.4	0.2	0.2	3.1	3.8
May	1.5	1.0	0.3	0.2	1.1	1.9	0.2	0.2	3.2	3.3
June	1.5	1.1	0.3	0.2	1.2	1.7	0.2	0.2	3.2	3.1
July	1.6	1.1	0.3	0.2	1.1	1.6	0.2	0.2	3.2	3.1
Aug.	2.2	1.4	0.3	0.2	1.3	1.7	0.2	0.3	4.0	3.5
Sept. ...	2.8	1.8	0.3	0.2	1.1	1.7	0.2	0.3	4.4	3.9
Oct.	1.8	1.2	0.3	0.2	1.1	1.6	0.2	0.2	4.0	3.3
Nov.	..	1.0	..	0.2	..	1.6	..	0.1	..	3.0
Dec.	..	0.9	..	0.2	..	1.7	..	0.2	..	3.0

ACCESSIONS

	1955	1954		1955	1954		1955	1954
Jan.	3.3	2.8	May	3.8	2.7	Sept.	4.4	3.4
Feb.	3.2	2.5	June	4.3	3.5	Oct.	4.0	3.6
Mar.	3.6	2.8	July	3.4	2.9	Nov.	..	3.3
Apr.	3.5	2.4	Aug.	4.5	3.3	Dec.	..	2.5

U. S. Department of Labor.

Wages and Hours in Selected Industries

(Production Workers)

Stamped and Pressed Metal Products

	EARNINGS (Hourly Avg.)		HOURS (Weekly Avg.)	
	1955	1954	1955	1954
Jan.	$2.09	$2.02	42.8	41.4
Feb.	2.09	1.99	42.7	40.6
Mar.	2.09	1.98	42.8	40.5
Apr.	2.08	1.99	42.2	40.5
May	2.10	2.01	42.8	41.3
June	2.08	2.01	41.1	40.9
July	2.15	2.01	42.3	39.5
Aug.	2.12	2.01	42.0	40.1
Sept. ...	2.11	2.04	41.5	41.1
Oct.	...	2.05	...	41.9
Nov.	...	2.07	...	42.5
Dec.	...	2.07	...	42.6

Metalworking Machinery

(Except Machine Tools)

	1955	1954	1955	1954
Jan.	$2.08	$2.04	41.0	41.8
Feb.	2.09	2.05	41.0	42.2
Mar.	2.09	2.05	41.3	42.0
Apr.	2.11	2.06	41.7	41.0
May	2.11	2.07	41.8	40.8
June	2.14	2.07	42.4	41.0
July	2.16	2.10	42.1	41.0
Aug.	2.19	2.08	42.9	41.2
Sept. ...	2.20	2.08	43.1	40.6
Oct.	...	2.08	...	40.1
Nov.	...	2.07	...	40.2
Dec.	...	2.09	...	40.7

Machine Tools

	1955	1954	1955	1954
Jan.	$2.10	$2.10	41.8	44.6
Feb.	2.11	2.09	42.0	44.8
Mar.	2.13	2.09	42.4	44.6
Apr.	2.13	2.07	43.1	43.2
May	2.16	2.08	44.0	42.6
June	2.18	2.09	44.8	41.8
July	2.17	2.08	43.5	41.0
Aug.	2.18	2.08	44.1	41.4
Sept. ...	2.19	2.10	42.8	41.6
Oct.	...	2.11	...	41.7
Nov.	...	2.10	...	41.1
Dec.	...	2.11	...	41.8

Fabricated Structural Metal Products

	1955	1954	1955	1954
Jan.	$1.95	$1.92	40.3	41.8
Feb.	1.95	1.92	40.1	41.4
Mar.	1.95	1.91	40.6	41.3
Apr.	1.96	1.91	40.8	41.0
May	1.97	1.92	41.4	41.3
June	1.99	1.92	41.9	41.8
July	2.03	1.93	41.2	41.0
Aug.	2.03	1.94	41.7	41.1
Sept. ...	2.05	1.94	42.0	40.9
Oct.	...	1.95	...	40.8
Nov.	...	1.95	...	40.8
Dec.	...	1.95	...	41.1

U. S. Department of Labor.

Agricultural Machinery and Tractors

	EARNINGS (Hourly Avg.)		HOURS (Weekly Avg.)	
	1955	1954	1955	1954
Jan.	$2.03	$1.95	40.4	39.5
Feb.	2.04	1.96	40.6	39.6
Mar.	2.05	1.97	41.0	40.1
Apr.	2.05	1.98	40.7	39.6
May	2.05	1.98	40.7	39.8
June	2.04	1.97	40.7	39.7
July	2.03	1.96	40.0	39.3
Aug.	2.06	1.97	40.1	39.3
Sept. ...	2.06	2.00	40.5	39.4
Oct.	...	1.99	...	38.6
Nov.	...	2.00	...	39.2
Dec.	...	2.01	...	40.0

Automobiles

	1955	1954	1955	1954
Jan.	$2.25	$2.19	43.0	41.0
Feb.	2.26	2.17	43.8	39.5
Mar.	2.27	2.15	44.3	39.5
Apr.	2.25	2.16	43.5	40.4
May	2.28	2.16	44.3	40.9
June	2.23	2.17	40.0	39.3
July	2.30	2.17	42.5	39.2
Aug.	2.30	2.20	41.5	40.0
Sept. ...	2.33	2.24	41.7	39.8
Oct.	...	2.23	...	40.6
Nov.	...	2.25	...	42.9
Dec.	...	2.26	...	44.0

Aircraft and Parts

	1955	1954	1955	1954
Jan.	$2.14	$2.05	41.5	40.6
Feb.	2.14	2.07	41.1	41.2
Mar.	2.14	2.06	41.3	41.0
Apr.	2.14	2.06	40.7	40.5
May	2.15	2.06	41.0	40.7
June	2.15	2.08	41.0	40.8
July	2.17	2.08	41.2	40.7
Aug.	2.17	2.09	41.0	40.8
Sept. ...	2.19	2.10	41.5	40.8
Oct.	...	2.10	...	40.7
Nov.	...	2.12	...	41.2
Dec.	...	2.12	...	41.4

Gray Iron Foundries

	1955	1954	1955	1954
Jan.	$1.93	$1.88	40.6	39.1
Feb.	1.95	1.86	41.6	38.5
Mar.	1.96	1.86	41.6	38.4
Apr.	1.98	1.87	42.2	38.8
May	1.99	1.87	43.1	38.8
June	1.97	1.87	42.0	39.2
July	2.01	1.86	41.5	39.1
Aug.	1.99	1.87	41.5	39.3
Sept. ...	2.02	1.88	42.5	39.1
Oct.	...	1.90	...	39.5
Nov.	...	1.91	...	39.8
Dec.	...	1.92	...	40.5

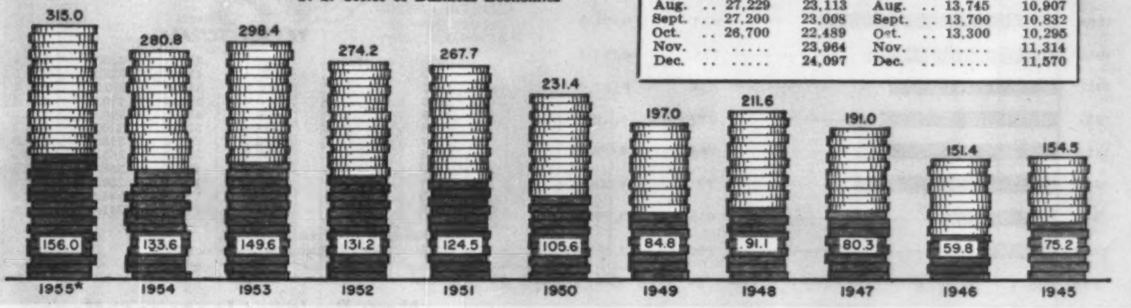
Trade

METALWORKING FACTS AND FIGURES

ANNUAL SALES TOTALS

(BILLIONS OF DOLLARS—NOT ADJUSTED FOR SEASONAL VARIATION)

Entire Bar=All Manufacturing Industries
Shaded Area=Durable Goods Industries
*Estimated.
U. S. Office of Business Economics



1955-1954 By Months

Millions of Dollars, Seasonally Adjusted

	All Manufacturing Industries			Durable Goods Industries	
	1955	1954		1955	1954
Jan.	24,287	23,486	Jan.	11,850	11,381
Feb.	24,649	23,475	Feb.	12,029	11,248
Mar.	25,976	23,637	Mar.	12,860	11,303
Apr.	26,025	23,681	Apr.	12,805	11,160
May	26,651	23,204	May	13,322	11,066
June	27,111	23,349	June	13,527	11,293
July	26,731	23,209	July	13,503	11,153
Aug.	27,229	23,113	Aug.	13,745	10,907
Sept.	27,200	23,008	Sept.	13,700	10,832
Oct.	26,700	22,489	Oct.	13,300	10,295
Nov.	.....	23,964	Nov.	.....	11,314
Dec.	.....	24,097	Dec.	.....	11,570

Inventories at End of Month

Millions of Dollars, Seasonally Adjusted

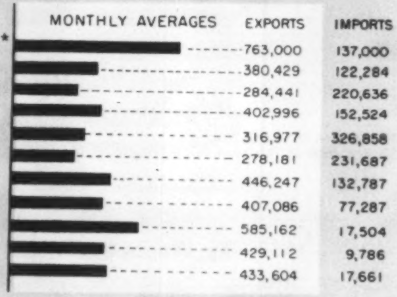
	All Manufacturing Industries		Durable Goods Industries	
	1955	1954	1955	1954
January	43,196	45,587	23,984	26,098
February	43,256	45,304	24,028	25,761
March	43,332	44,995	24,112	25,577
April	43,264	44,495	24,159	25,145
May	43,549	44,335	24,304	24,908
June	43,779	44,185	24,457	24,617
July	43,938	43,431	24,563	24,011
August	44,315	43,059	24,768	23,836
September	44,700	42,908	25,200	23,709
October	45,200	43,168	25.500	23.916
November	.....	43,270	.....	23,959
December	.....	43,265	.....	24,023

U. S. Office of Business Economics.

IRON & STEEL PRODUCTS

Exports and Imports

Excluding Advanced Manufactures—Net Tons



1955-1954 By Months

	Exports		Imports	
	1955	1954	1955	1954
January	631,371	315,013	104,291	86,632
February	660,518	300,404	112,934	70,839
March	778,290	316,151	109,723	86,726
April	801,766	360,814	116,948	103,650
May	815.901	271,164	139,166	123,409
June	844,999	326,515	132,644	140,311
July	827,315	344,012	103,978	139,629
August	672,163	369,451	184,286	149,686
September	......	409,286	......	147,345
October	......	431,762	......	137,804
November	......	453,038	......	153,275
December	......	667,541	......	128,106

U. S. Office of Business Economics.

Manufacturers' New Orders

Value—Millions of Dollars. Adjusted for Seasonal Variation

1955	Total Durables	Primary Metals	Fab. Metal Products	Mchy.	Transptn. Equip.	Other† Durables	Total Durables 1954	Total Durables 1953	Total Durables 1952
Jan.	12,142	2,136	1,135	2,936	3,350	2,585	9,376	12,884	11,409
Feb.	12,170	2,446	1,120	3,233	2,871	2,500	9,394	12,069	10,983
Mar.	13,353	2,586	1,306	3,404	3,325	2,732	9,585	11,919	12,029
Apr.	12,879	2,385	1,194	3,179	3,337	2,784	9,619	12,232	12,154
May	14,331	2,538	1,366	3,531	3,966	2,930	9,588	12,472	10,523
June	14,033	2,477	1,562	3,734	3,225	3,035	9,822	12,225	12,167
July	13.571	2,339	1,445	3,656	3,334	2,797	9,407	11,497	11,409
Aug.	15,145	2,611	1,606	3,833	3,844	3,251	9,756	10,038	11,321
Sept.	14,957	2,591	1,596	3.939	3,682	3,149	11,153	9,650	12,229
Oct.	14,100	....	....	....	....	....	10,790	9,527	11,715
Nov.	.....	....	....	....	....	....	10,491	9,098	11,311
Dec.	.....	....	....	....	....	....	11,963	9,253	12,453

† Includes ordnance, professional and scientific instruments, lumber, furniture, stone, clay and glass and miscellaneous industries.
U. S. Office of Business Economics.

Foreign Trade

Value—Millions of Dollars

	Exports			Imports		
	1955	1954	1953	1955	1954	1953
Jan.	1,165.6	1,091.5	1,291	807.3	833.7	922.3
Feb.	1,233.2	1,182.6	1,198	849.5	808.7	855.9
Mar.	1,342.3	1,125.2	1,389	1,018.9	861.8	1,004.5
Apr.	1,263.6	1,425.6	1,393	870.7	957.3	1,012.6
May	1,308.0	1,400.2	1,451	966.1	829.0	901.5
June	1,315.8	1,473.4	1,383	938.8	946.4	933.0
July	1,267.1	1,290.9	1,357	885.3	821.7	907.6
Aug.	1,228.3	1,155.7	1,186	958.9	824.7	840.0
Sept.	1,248.4	1,114.1	1,256	953.0	780.5	925.7
Oct.	.....	1,265.0	1,253	....	763.3	813.6
Nov.	.....	1,249.2	1,247	....	839.5	848.7
Dec.	.....	1,318.2	1,353	....	942.3	906.9

U. S. Bureau of the Census.

Monthly Averages

	Exports	Imports
1955*	1,260	920
1954	1,258	851
1953	1,313	906
1952	1,264	893
1951	1,253	914
1950	856	738
1949	1,004	552
1948	1,054	594
1947	1,278	480
1946	812	412
1945	817	347
1944	1,188	327
1943	1,080	282

*Estimated.

Iron and Steel Scrap

(Net Tons)

	Exports		Imports	
	1955	1954	1955	1954
Jan.	368,280	62,316	11,124	1,325
Feb.	359,187	66,790	24,923	2,016
Mar.	421,004	103,464	11,524	1,355
Apr.	413,481	65,419	13,302	3,121
May	450,418	40,561	9,836	11,073
June	512,579	101,475	13,041	14.650
July	448,402	100,114	11,777	22,033
Aug.	328,060	125,582	27,120	29,448
Sept.	.....	192,980	.....	31,796
Oct.	.....	182,296	.....	20,573
Nov.	.....	223,398	.....	41,256
Dec.	.....	400,797	....	27,695

U. S. Office of Business Economics.

Monthly Averages

	Exports	Imports
1955*	415,000	15,000
1954	138,766	17,195
1953	25,310	10,964
1952	28,383	8,825
1951	19,228	29,925
1950	18,080	61,483
1949	24,883	91,994
1948	20,308	36,226
1947	16,173	3,016
1946	12,424	2,519
1945	7,978	3,856
1944	7,973	9,070
1943	4,575	11,955

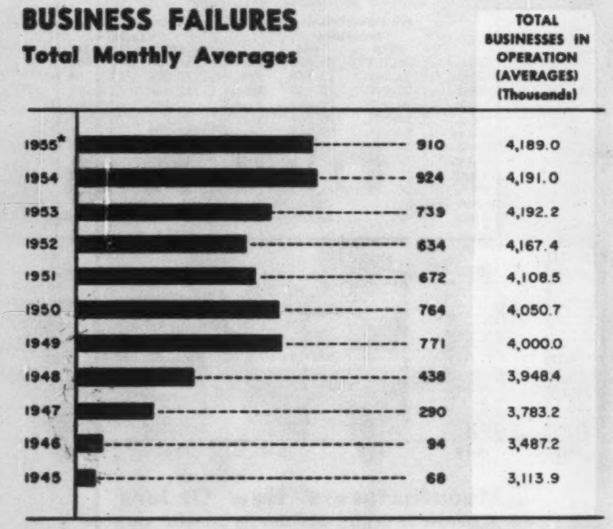
* Estimated.

Trade

METALWORKING FACTS AND FIGURES

BUSINESS FAILURES

Total Monthly Averages



Failures—Liabilities

	FAILURES			LIABILITIES	
	Total	Construction	Mfg., Mining	Construction	Mfg., Mining
1955					
January	939	87	195	$9,044,000	$11,636,000
February	877	113	188	7,624,000	18,922,000
March	1,038	108	225	4,468,000	16,921,000
April	903	106	154	6,450,000	12,653,000
May	955	121	168	4,885,000	14,093,000
June	914	114	200	4,702,000	13,888,000
July	861	102	179	6,289,000	11,865,000
August	888	134	158	9,663,000	10,102,000
September	822	114	168	4,256,000	10,798,000
October	919	136	180	8,713,000	10,407,000
November	...	...	...	....	....
December	...	...	...	....	....

Monthly Averages

	Total	Construction	Mfg., Mining	Construction	Mfg., Mining
1955*	914	...	...	....	....
1954	924	109	190	$4,735,750	$14,273,667
1953	738	85	155	3,610,583	13,237,833
1952	634	70	132	3,012,083	8,746,167
1951	672	80	128	3,123,000	7,581,000
1950	764	76	173	2,138,000	7,925,000
1949	771	70	194	2,270,000	11,939,000
1948	438	37	123	1,301,000	10,858,000
1947	290	20	106	601,000	11,894,000
1946	94	12	39	362,000	3,241,000
1945	68	8	23	297,000	1,437,000

Dun & Bradstreet Inc.

*Estimated.

Businesses in Operation

(In Thousands at Beginning of Half)

	Total	Contract Construction	Manufacturing	Service
1955*	4,189.0	....	....	....
1st Half	4,182.0	443.0	311.0	741.0
2nd Half	.....	....	....	....
1954 (Avg.)	4,191.0	436.3	319.7	740.6
1st Half	4,185.3	431.3	321.8	739.0
2nd Half	4,196.7	441.3	317.6	742.3

YEARLY TOTALS

	Total	Contract Construction	Manufacturing	Service
1953	4,192.2	425.0	326.7	740.4
1952	4,167.4	411.0	328.8	739.5
1951	4,108.5	388.6	327.2	735.5
1950	4,050.7	370.5	320.7	735.6
1949	4,000.0	347.5	320.5	736.8
1948	3,948.4	329.0	320.0	738.3
1947	3,783.2	292.6	312.0	711.5
1946	3,487.2	243.8	285.9	656.5
1945	3,113.9	176.8	258.4	591.5
1944	2,916.5	153.3	250.3	551.8
1943	2,905.1	157.2	244.9	553.6
1942	3,185.8	176.9	241.5	604.6

*Estimated by STEEL.
U. S. Office of Business Economics.

New Business Incorporations

	1955	1954	1953	1952	1951
January	13,181	9,543	9,468	8,357	8,515
February	11,369	8,533	7,943	7,138	6,590
March	13,417	10,514	9,659	7,902	7,649
April	11,756	10,272	9,507	8,284	7,653
May	12,029	9,280	8,968	7,915	7,544
June	12,605	9,748	8,926	7,819	6,810
July	10,893	9,409	8,703	7,549	6,428
August	10,983	9,041	7,487	7,088	6,496
September	11,024	9,256	7,433	7,529	5,950
October	10,698	9,852	8,267	8,223	6,812
November	.....	9,735	7,269	6,741	6,289
December	.....	11,981	8,915	8,274	6,913
Total	.....	117,164	102,545	92,819	83,649
Monthly Avg.	11,705	9.764	8.545	7.735	6,971

Dun & Bradstreet Inc.

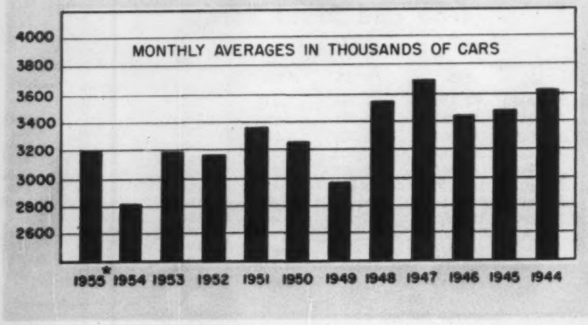
Discontinued Businesses

(Thousands)

	Total	Contract Construction	Manufacturing	Service
1955*	330.0	...	...	...
1954	334.0	...	...	...
1953	334.0	50.7	31.5	52.6
1952	306.6	45.5	29.1	50.8
1951	309.3	46.7	26.4	54.2
1950	289.6	39.2	24.7	57.8
1949	306.5	40.7	30.8	60.7
1948	282.0	36.3	27.4	62.3

*Estimated by STEEL.
U. S. Office of Business Economics.

FREIGHT CARLOADINGS



1955—By Weeks

Jan. 1....	529,452	May 7....	740,935	Sept. 3....	794,192
Jan. 8....	602,203	May 14...	757,333	Sept. 10...	706,575
Jan. 15...	644,940	May 21...	774,419	Sept. 17...	822,214
Jan. 22...	635,653	May 28...	790,176	Sept. 24...	819,025
Jan. 29...	641,979	June 4....	713,673	Oct. 1....	820,312
Feb. 5....	640,735	June 11...	786,707	Oct. 8....	807,035
Feb. 12...	643,859	June 18...	785,425	Oct. 15...	827,245
Feb. 19...	655,035	June 25...	799,472	Oct. 22...	834,499
Feb. 26...	635,453	July 2....	696,734	Oct. 29...	835,396
Mar. 5....	658,975	July 9....	652,680	Nov. 5....	808,709
Mar. 12...	666,548	July 16...	799,040	Nov. 12...	796,632
Mar. 19...	656,117	July 23...	786,433	Nov. 19...	771,648
Mar. 26...	639,447	July 30...	795,771	Nov. 26...	676,685
Apr. 2....	659,059	Aug. 6....	765,452	Dec. 3....	728,216
Apr. 9....	663,462	Aug. 13...	775,397	Dec. 10...	....
Apr. 16...	674,389	Aug. 20...	780,863	Dec. 17...	......
Apr. 23...	705,848	Aug. 27...	791,977	Dec. 24...	......
Apr. 30...	730,137			Dec. 31...	......

Association of American Railroads.

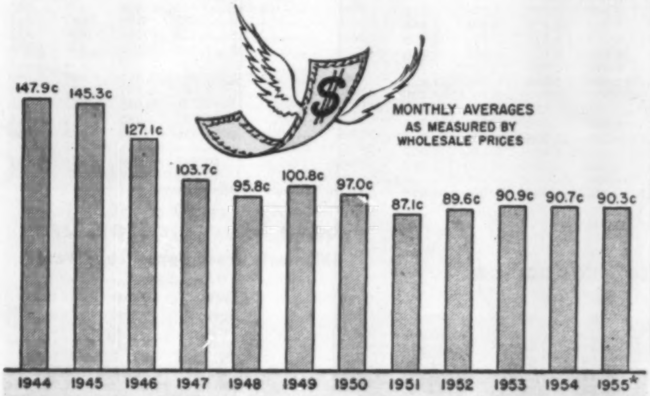
*Estimated.

Finance

METALWORKING FACTS AND FIGURES

PURCHASING POWER OF THE DOLLAR

(1947-1949=100)



AS MEASURED BY:

	Whole-sale Prices	Con-sumers' Prices	Retail Food Prices
1955*	90.3	87.3	90.0
Jan.	90.8	87.5	90.4
Feb.	90.6	87.5	90.3
Mar.	90.9	87.5	90.3
Apr.	90.5	87.6	89.9
May	91.0	87.6	90.0
June	90.7	87.4	89.8
July	90.5	87.2	89.2
Aug.	90.2	87.3	89.9
Sept.	89.5	87.0	89.6
Oct.	89.7	87.0	90.3
Monthly Averages			
1954	90.6	87.1	88.8
1953	90.8	87.4	88.7
1952	89.6	88.1	87.3
1951	87.1	90.1	88.8
1950	97.0	97.3	98.8
1949	100.8	98.2	100.0
1948	95.8	97.3	96.1
1947	103.7	104.7	104.3
1946	127.1	119.9	126.6
1945	145.3	130.0	145.1

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*Estimated.
U. S. Office of Business Economics.

National Income

(Millions of Dollars)

1955*.	322,700
1954..	299,673
1953..	303,648
1952..	289,537
1951..	277,041
1950..	239,956
1949..	216,193
1948..	221,641
1947..	197,168
1946..	179,577
1945..	181,248
1944..	182,639
1943..	170,310
1942..	137,694
1941..	104,710
1940..	81,634
1939..	72,753
1938..	67,581
1937..	73,618
1936..	64,911
1935..	57,057
1934..	48,959

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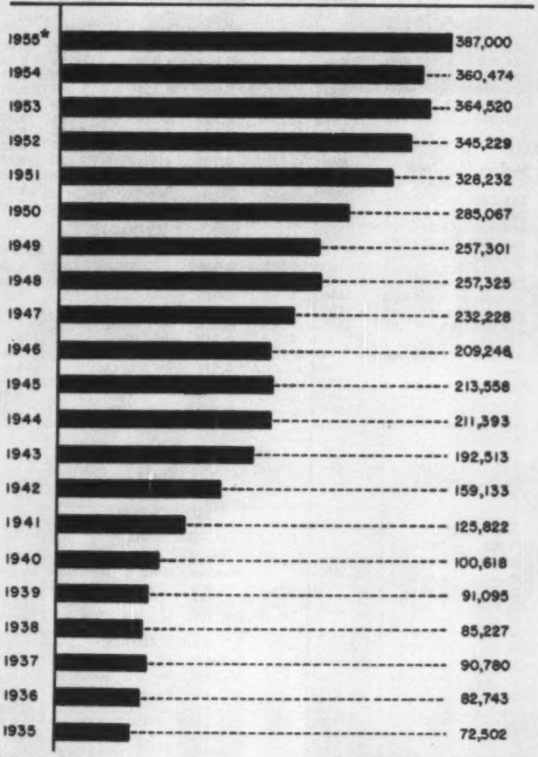
*Estimated.
Dept. of Com.

GROSS NATIONAL PRODUCT OR EXPENDITURE

(Millions of Dollars)



*Estimated. Department of Commerce.

U. S. Revenues, Expenditures, Debt

Year	Net Receipts 000,000	Per Capita Receipts	Ex-penditures 000,000	Per Capita Expenditures	Gross Debt 000,000	Per Capita Debt
1955....	$60,302	$365.41	$64,492	$390.81	$274,374	$1662.64
1954....	64,356	396.80	68,131	420.08	271,260	1672.51
1953....	65,219	408.97	74,608	467.84	266,071	1668.44
1952....	62,129	396.31	66,146	421.93	259,105	1652.77
1951....	48,142	312.36	44,632	289.59	255,222	1655.97
1950....	37,043	244.42	40,167	265.03	257,357	1698.13
1949....	38,246	256.68	40,057	268.83	252,770	1696.44
1948....	44,746	306.24	36,326	248.61	252,292	1726.68
1947....	44,703	311.77	42,505	296.44	258,376	1801.94
1946....	43,037	305.25	65,018	461.17	269,422	1910.97
1945....	46,456	332.78	100,404	719.25	258,682	1853.01
1944....	44,149	319.92	93,743	679.29	201,003	1455.52
1943....	22,281	163.25	78,182	572.83	136,696	1001.55
1942....	12,799	95.25	32,491	241.80	72,422	537.35
1941....	7,607	57.29	12,774	74.16	48,961	367.54
1940....	5,387	44.09	9,127	70.65	42,967	325.63
1939....	5,164	43.21	8,765	70.65	40,445	308.34
1938....	5,854	47.89	7,304	59.70	37,167	285.43
1937....	5,028	40.93	8,281	62.69	36,427	281.82
1936....	4,115	32.17	9,068	69.41	33,545	261.20
1935....	3,800	29.88	7,583	58.00	28,701	225.07
1934....	3,115	24.64	6,370	56.19	27,053	213.65
1933....	2,079	16.54	4,325	40.91	22,538	179.21
1932....	2,005	16.06	4,948	41.28	19,487	155.93
1931....	3,190	25.70	4,091	32.99	16,801	135.37
1930....	4,177	33.01	3,994	32.42	16,185	131.49
1929....	4,033	33.19	3,848	31.67	16,931	139.40
1928....	4,042	33.73	3,643	30.40	17,604	146.69
1927....	4,129	34.94	3,493	29.56	18,510	156.04
1926....	3,962	33.98	3,584	30.76	19,643	167.70
1925....	3,780	32.91	3,529	30.73	20,516	177.82
1924....	4,012	35.44	3,507	30.98	21.251	186.86
1923....	4,007	35.93	3,697	33.15	22,349	200.10
1922....	4,109	37.40	3,795	34.54	22,964	208.97
1921....	5,625	51.98	5,538	51.18	23,976	221.09
1920....	6,695	62.83	6,482	60.84	24,297	228.32

Annual Statements of the Treasury.

Corporate Income, Taxes, Dividends

(All Industries—Millions of Dollars)

	Income Before Taxes	Taxes†	Income After Taxes	Dividend Payments	Undistributed Income
1955					
1st Qtr. ...	40,900§	20,500§	20,400§	1,422	.....
2nd Qtr. ...	43,000§	21,600§	21,400§	1,436	.....
1954	34,042	17,082	16,960	10,008	6,952
1953	38,274	21,266	17,008	9,291	7,717
1952	35,936	19,788	16,148	9,000	7,148
1951	41,173	22,476	18,697	9,090	9,607
1950	39,970	17,829	22,141	9,207	12,934
1949	26,198	10,411	15,787	7,458	8,329
1948	32,769	12,510	20,259	7,248	13,011
1947	29,525	11,283	18,242	6,521	11,721

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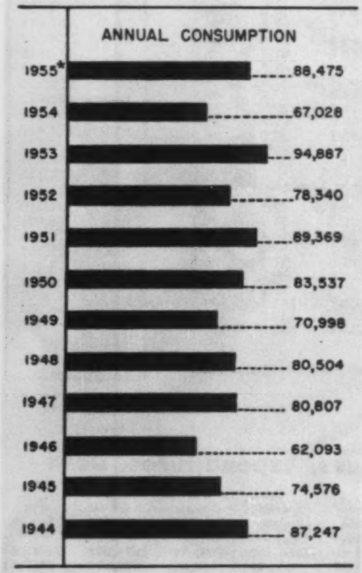
† Federal and state corporate income and excess profits tax liability.
§ Seasonally adjusted quarterly totals at annual rates.
Department of Commerce.

Fuel-Power-Raw Materials

METALWORKING FACTS AND FIGURES

IRON ORE

(Lake Superior)



1955-1954 By Months

Thousands of Gross Tons

Consumption at U. S. and Canadian furnaces. Stocks at U. S. and Canadian furnaces and at Lake Erie docks.

	Consumption 1955	Consumption 1954	Stocks 1955	Stocks 1954
Jan. ...	6,620	6,996	37,470	41,974
Feb. ...	6,447	5,787	31,108	36,386
Mar. ...	7,481	5,932	23,711	30,587
Apr. ...	7,290	5,287	18,907	26,142
May ...	7,798	5,376	21,901	29,563
June ...	7,473	5,396	27,355	34,996
July ...	7,273	5,155	33,424	40,723
Aug. ..	7,485	4,895	39,506	45,733
Sept. ..	7,539	4,620	45,406	49,753
Oct. ...	7,850	5,398	49,523	51,868
Nov. ...	....	5,845	......	49,975
Dec. ...	....	6,341	......	44,018
Total..	....	67,028	.....	.....

*Estimated.
Lake Superior Iron Ore Association.

Iron Ore Production

All U. S. Districts

Thousands of Gross Tons

	1955	1954	1953	1952	1951
Jan. ..	2,787	3,068	3,387	3,704	3,812
Feb. ..	2,741	2,982	3,214	3,605	3,315
Mar. ..	3,227	3,117	4,113	3,714	3,525
Apr. ..	6,056	4,466	9,971	9,073	8,795
May ..	11,820	9,818	14,287	13,693	14,362
June ..	13,704	11,610	15,368	1,552	14,932
July ..	13,034	10,994	15,719	2,783	15,103
Aug. ..	14,160	10,295	15,473	14,974	15,832
Sept. .	....	8,913	15,143	15,912	14,764
Oct. ..	....	6,776	12,290	14,271	13,900
Nov. ..	....	3,272	6,392	9,448	7,052
Dec. ..	....	2,907	3,183	3,260	3,682
Total .	....	78,218	118,540	95,989	119.074

U. S. Bureau of Mines.

Coke Production

Net Tons

	Oven	Beehive	Total
1955*	....	......	79,000,000
Jan.	5,745,421	60,505	5,805,926
Feb.	5,326,969	67,197	5,394,166
Mar.	6,130,731	105,178	6,235,909
Apr.	6,013,542	122,103	6,135,645
May	6,286,982	139,765	6,426,747
June	6,000,707	147,319	6,148,026
July	6,038,615	144,918	6,183,533
Aug.	6,229,065	166,357	6,395,422
Sept.	6,232,929	160,419	6,393,348
Oct.	....	......	....
Nov.	....	......	....
Dec.	....	......	....

	Oven	Beehive	Total
1954	59,061,400	601,100	59,662,500
Jan.	5,643,100	164,900	5,808,000
Feb.	4,831,300	63,200	4,894,500
Mar.	5,117,500	35,600	5,153,100
Apr.	4,667,600	36,800	4,704,400
May	4,782,100	32,800	4,814,900
June	4,618,000	34,500	4,652,500
July	4,600,600	33,700	4,634,300
Aug.	4,485,800	44,000	4,529,800
Sept.	4,464,900	40,200	4,505,100
Oct.	5,063,400	32,500	5,095,900
Nov.	5,207,200	39,700	5,246,900
Dec.	5,579,900	43,200	5,623,100

YEARLY TOTALS

	Oven	Beehive	Total
1955*	....	....	79,000,000
1954	59,061,400	601,100	59,662,500
1953	73,593,600	5,243,300	78,836,900
1952	63,850,100	4,404,000	68,254,100
1951	71,987,200	7,343,500	79,330,700
1950	66,890,618	5,827,420	72,718,038
1949	60,222,481	3,414,948	63,637,429
1948	68,284,357	6,577,571	74,861,928
1947	66,758,549	6,687,301	73,445,850
1946	53,929,447	4,568,401	58,497,848
1945	62,094,288	5,213,893	67,308,181
1944	67,064,795	6,973,022	74,037,817
1943	63,742,676	7,933,387	71,676,063

*Estimated.
U. S. Bureau of Mines.

Iron Ore Imports

Thousands of Gross Tons

	1955	1954	1953	1952	1951
Jan.	1,081	846	681	659	622
Feb.	931	795	576	624	573
Mar.	1,248	844	576	674	661
Apr.	1,220	932	780	687	741
May	2,045	1,119	966	699	834
June	2,490	1,496	1,125	860	1,235
July	2,498	1,540	1,148	726	1,083
Aug.	2,871	1,691	1,109	847	1,049
Sept.	....	1,881	1,137	1,172	848
Oct.	....	1,736	1,085	1,065	1,105
Nov.	....	1,720	965	1,012	740
Dec.	....	1,178	948	746	656
Total	....	15,778	11,096	9,771	10.147

U. S. Bureau of the Census.

Lake Superior Iron Ore

Shipments from Upper Lake Ports

Gross Tons

	1955	1954	1953
Jan.	none	none	none
Feb.	none	none	none
Mar.	none	none	312,806
Apr.	3,758,006	1,524,702	8,403,842
May	11,605,747	9,951,556	13,596,829
June	12,595,259	10,608,262	13,744,894
July	13,334,308	11,016,010	14,496,938
Aug.	13,572,266	9,554,681	15,236,744
Sept.	12,756,566	7,951,317	13,213,573
Oct.	12,243,518	7,251,905	11,538,392
Nov.	7,409,793	2,917,620	5,300,431
Dec.	....	17,644	none
Total	....	60,793,697	95.844.449

Lake Superior Iron Ore Association.

Iron & Steel Scrap

Thousands of Net Tons

	Consumption 1955	Consumption 1954	Stocks† 1955	Stocks† 1954
Jan.	6,066	5,123	7,284	7,004
Feb.	5,993	4,912	7,156	6,940
Mar.	7,071	5,194	7,158	6,811
Apr.	6,988	5,133	7,243	6,571
May	7,186	5,350	7,259	6,315
June	6,852	5,224	7,184	6,315
July	6,101	4,378	7,132	6,494
Aug.	6,623	4,664	7,357	6,599
Sept.	6,788	4,814	7,355	6,510
Oct.	7,216	5,356	7,385	6,509
Nov.	....	5,520	....	6,852
Dec.	....	5,685	....	7,349

MONTHLY AVERAGES

Consumption		Consumers' Stocks†	
1955*........	6,635	1955*........	7,240
1954.........	5,113	1954.........	6,689
1953.........	6,442	1953.........	6,737
1952.........	5,752	1952.........	6,104
1951.........	6,395	1951.........	4,472
1950.........	5,742	1950.........	5,272
1949.........	4,528	1949.........	5,631
1948.........	5,414	1948.........	4,980
1947.........	5,072	1947.........	3,966
1946.........	4,124	1946.........	3,757
1945.........	4,683	1945.........	4,073
1944.........	5,112	1944.........	5,268

†End of month. *Estimated.
U. S. Bureau of Mines.

Fluorspar

Net Tons

1955	Production	Imports	Consumption	Stocks†
1st Qtr..	57,087	82,311	131,486	155,944
2nd Qtr.	70,038	87,257	144,520	154,635
1st Half	127,125	169,568	276,006	154.635

YEARLY TOTALS

	Production	Imports	Consumption	Stocks†
1954	248,983	294,742	478,641	178,025
1953	322,800	361,219	586,798	258,502
1952	345,400	352,503	520,197	279,657
1951	341,300	181,275	497,012	182,409
1950	283,500	164,634	426,121	183,723
1949	236,400	95,619	345,221	167,660
1948	336,000	111,626	406,269	184,213

U. S. Bureau of Mines. †End of period.

Scrap Consumption by Industries

Thousands of Net Tons

	Makers of Steel Ingots and Castings[1] 1955	Makers of Steel Ingots and Castings[1] 1954	Makers of Steel Castings[3] 1955	Makers of Steel Castings[3] 1954	Iron Foundries and Misc. 1955	Iron Foundries and Misc. 1954	Total* 1955	Total* 1954
Jan.	4,889	4,066	216	236	962	821	6,066	5,123
Feb.	4,794	3,864	228	230	970	818	5,993	4,912
Mar.	5,623	4,020	282	256	1,167	917	7,071	5,194
Apr.	5,577	4,023	267	231	1,143	879	6,988	5,133
May	5,806	4,312	274	210	1,107	828	7,188	5,350
June	5,459	4,155	285	214	1,108	855	6,852	5,224
July	5,029	3,560	205	152	867	667	6,101	4,378
Aug.	5,299	3,671	287	201	1,036	793	6,623	4,664
Sept.	....	3,812	...	198	....	804	....	4,814
Oct.	....	4,311	...	196	....	849	....	5,356
Nov.	....	4,461	...	193	....	867	....	5,520
Dec.	....	4,524	...	227	....	933	....	5,685

[1] Includes only those castings made by companies producing steel ingots.
[2] Excludes companies that produce both steel castings and steel ingots.
*Totals are not necessarily additive because of rounded figures.
U. S. Bureau of Mines.

Fuel-Power-Raw Materials

METALWORKING FACTS AND FIGURES

U. S. Electricity Production Capacity

Thousands of Kilowatts

1955			
January	103,617	July	108,786
February	103,742	August	110,029
March	104,928	September	110,910
April	105,305	October	......
May	106,324	November	......
June	107,617	December	......

CAPACITIES AT YEAR END

1954	102,520	1950	68,919	1946	50,317
1953	91,502	1949	63,100	1945	50,111
1952	82,226	1948	56,560	1944	49,189
1951	75,775	1947	52,322	1943	47,951

Edison Electric Institute.

Liquid Petroleum Gas Consumption in Steel Industry

Gallons

	Heating and Annealing	All Other	Total
1954	6,700,742	874,980	7,575,722
1953	8,473,351	1,647,095	10,120,446
1952	8,903,865	1,115,805	10,019,670

American Iron & Steel Institute.

Fuel Oil Consumption in Steel Industry

Thousands of Gallons

	Melting Furnaces	Heating, Annealing, etc.	Total
1954	1,239,305	558,989	1,798,294
1953	1,708,471	684,745	2,393,216
1952	1,579,960	660,165	2,240,125
1951	1,781,660	742,050	2,523,710
1950	1,618,723	675,481	2,294,204
1949	1,272,367	562,930	1,835,297
1948	1,533,129	662,410	2,195,539

American Iron & Steel Institute.

ELECTRICITY OUTPUT

By Plants Contributing to Public Supply
Millions of Kilowatt-hours

1955—By Weeks

Jan. 1	9,425	May 7	9,586	Sept. 3	10,706
Jan. 8	9,833	May 14	9,673	Sept. 10	10,155
Jan. 15	9,928	May 21	9,730	Sept. 17	10,623
Jan. 22	9,981	May 28	9,976	Sept. 24	10,756
Jan. 29	10,003	June 4	9,537	Oct. 1	10,627
Feb. 5	10,047	June 11	10,041	Oct. 8	10,639
Feb. 12	9,922	June 18	9,987	Oct. 15	10,599
Feb. 19	9,912	June 25	10,226	Oct. 22	10,644
Feb. 26	9,725	July 2	10,138	Oct. 29	10,659
Mar. 5	9,727	July 9	9,759	Nov. 5	10,853
Mar. 12	9,726	July 16	10,440	Nov. 12	10,878
Mar. 19	9,814	July 23	10,620	Nov. 19	11,149
Mar. 26	9,907	July 30	10,727	Nov. 26	10,727
Apr. 2	9,804	Aug. 6	10,925	Dec. 3	11,359
Apr. 9	9,633	Aug. 13	10,729	Dec. 10	....
Apr. 16	9,602	Aug. 20	10,812	Dec. 17	....
Apr. 23	9,697	Aug. 27	10,906	Dec. 24	....
Apr. 30	9,699			Dec. 31	....

Edison Electric Institute and Federal Power Commission.

YEARLY TOTALS

Millions of Kilowatt-hours

1955*	540,000
1954	471,609
1953	442,665
1952	399,224
1951	370,673
1950	329,141
1949	291,100
1948	282,698
1947	255,739
1946	223,178
1945	222,486
1944	228,189
1943	217,759

*Estimated.

Industrial Coal Stocks

(Bituminous)
Thousands of Net Tons at End of Month

	1955	1954		1955	1954
Jan.	65,166	74,531	July	66,845	66,286
Feb.	63,130	74,029	Aug.	69,701	67,656
Mar.	63,022	71,146	Sept.	70,435	68,764
Apr.	63,270	69,611	Oct.	....	69,455
May	64,471	68,606	Nov.	....	70,109
June	68,310	68,803	Dec.	....	68,391

U. S. Bureau of Mines.

Natural Gas Consumption in Steel Industry

Millions of Cubic Feet

	Melting Furnaces	Heating, Annealing	All Other	Total
1954	40,302	196,075	43,682	280,059
1953	44,765	139,339	39,794	223,898
1952	40,096	125,842	43,051	208,989
1951	44,669	126,380	35,748	206,797
1950	44,398	128,205	31,249	203,852
1949	36,542	96,319	30,180	163,041
1948	39,503	99,666	28,078	167,247
1947	34,708	90,220	24,008	148,936
1946	30,313	86.913	27,153	144.379

American Iron & Steel Institute.

Bituminous Coal Consumption

Thousands of Net Tons

	Industrial Consumption		Retail Deliveries		Total	
	1955	1954	1955	1954	1955	1954
Jan.	30,101	31,436	6,233	8,336	36,334	39,772
Feb.	27,916	26,560	5,853	6,402	33,769	32,962
Mar.	30,243	27,969	4,862	6,165	35,105	34,134
Apr.	28,368	24,487	2,839	3,471	31,207	27,958
May	29,123	23,831	2,355	2,646	31,478	26,477
June	28,716	23,256	2,640	2,279	31,356	25,535
July	29,083	22,836	2,358	2,101	31,441	24,937
Aug.	30,831	23,585	3,400	2,868	34,231	26,453
Sept.	30,556	23,491	4,311	3,622	34,867	27,113
Oct.	.....	25,783	....	4,397	.....	30,180
Nov.	.....	26,996	....	4,542	.....	31,538
Dec.	.....	29,713	....	5,787	.....	35,500

U. S. Office of Business Economics.

Monthly Averages

	Industrial Consumption	Retail Deliveries	Total
1954	25,829	4,385	30,213
1953	30,365	5,108	35,473
1952	29,128	5,699	34,827
1951	32,624	6,378	39,001
1950	30,573	7,217	37,790
1949	29,530	7,525	37,055
1948	35,759	7,479	43,238
1947	37,087	8,264	45,350
1946	33,202	8,382	41,584

U. S. Bureau of Mines.

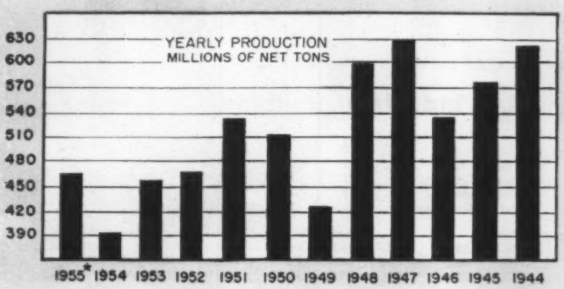
Natural Gas Sales

Millions of Therms

	Residential	Industrial, Commercial	Other	Total
1955				
1st Qtr.	8,715	10,159	691	19,565
2nd Qtr.	3,931	9,602	688	14,221
3rd Qtr.	....	....	....	....
4th Qtr.	....	....	....	....
1954				
1st Qtr.	7,688	9,599	653	17,940
2nd Qtr.	3,755	8,873	570	13,198
3rd Qtr.	1,588	9,036	714	11,338
4th Qtr.	4,723	9,780	849	15,352

American Gas Association.

BITUMINOUS COAL OUTPUT



1955—By Weeks

Thousands of Net Tons

Jan. 1	7,430	May 7	8,690	Sept. 3	9,520
Jan. 8	8,510	May 14	8,865	Sept. 10	8,570
Jan. 15	8,860	May 21	9,250	Sept. 17	9,970
Jan. 22	8,540	May 28	9,365	Sept. 24	9,570
Jan. 29	8,835	June 4	8,790	Oct. 1	9,620
Feb. 5	8,700	June 11	9,345	Oct. 8	9,835
Feb. 12	8,690	June 18	9,640	Oct. 15	9,800
Feb. 19	8,935	June 25	9,700	Oct. 22	9,760
Feb. 26	8,800	July 2	2,240	Oct. 29	9,990
Mar. 5	7,780	July 9	7,390	Nov. 5	10,180
Mar. 12	8,380	July 16	9,730	Nov. 12	9,850
Mar. 19	8,050	July 23	9,490	Nov. 19	10,206
Mar. 26	7,900	July 30	9,650	Nov. 26	9,025
Apr. 2	7,350	Aug. 6	9,190	Dec. 3	....
Apr. 9	8,225	Aug. 13	9,320	Dec. 10	....
Apr. 16	8,445	Aug. 20	9,475	Dec. 17	....
Apr. 23	8,610	Aug. 27	9.730	Dec. 24	....
Apr. 30	8,600			Dec. 31	....

U. S. Bureau of Mines.

*Estimated.

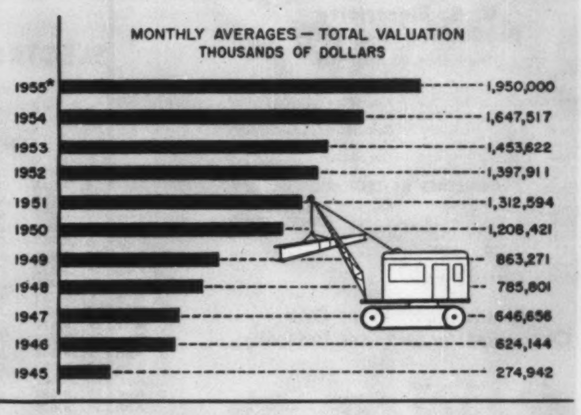
Construction

CONSTRUCTION VALUATION

37 Eastern States—Thousands of Dollars

	Total		Public Works, Utilities		Residential and Nonresidential	
	1955	1954	1955	1954	1955	1954
Jan.	1,504,450	1,151,987	249,307	216,428	1,255,143	935,559
Feb.	1,581,143	1,221,260	302,578	243,775	1,278,565	977,485
Mar.	2,134,819	1,527,517	386,219	327,720	1,748,600	1,199,797
Apr.	2,322,085	1,691,868	545,937	290,308	1,776,148	1,401,560
May	2,185,065	1,925,253	448,000	427,665	1,737,065	1,497,588
June	2,255,209	1,733,264	461,487	356,553	1,793,722	1,376,711
July	2,271,537	1,836,935	419,888	449,982	1,851,649	1,386,953
Aug.	1,894,841	1,572,865	377,960	329,579	1,516,881	1,243,286
Sept.	2,034,895	1,816,232	592,710	392,075	1,442,185	1,424,157
Oct.	1,862,692	1,965,339	387,913	442,581	1,474,779	1,522,758
Nov.	1,796,787	1,498,850	408,467	299,069	1,388,320	1,199,781
Dec.	....	1,828,837	......	365,833	....	1,463,004
Total	....	19.770.207	......	4,141,568	....	15,628,639

F. W. Dodge Corp. *Estimated.

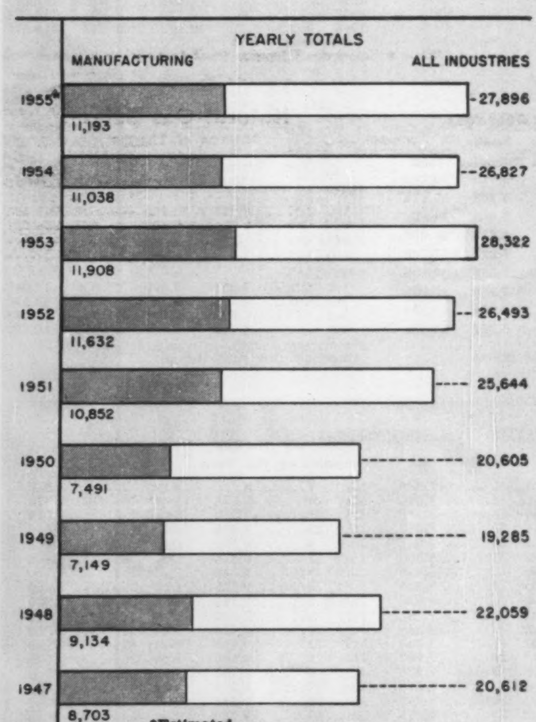


NEW PLANT AND EQUIPMENT EXPENDITURES

Millions of Dollars

(Figures do not necessarily add to totals, due to rounding.)

	Manufacturing		All Industries	
	1955	1954	1955	1954
1st Quarter	2,249	2,569	5,847	6,266
2nd Quarter	2,795	2,859	7,009	6,932
3rd Quarter	3,075	2,645	7,724	6,640
4th Quarter	3,074	2,965	7,316	6,988
Total	11.193*	11,038	27,896*	26,827



*Estimated.
U. S. Office of Business Economics and Securities & Exchange Commission.

NEW HOUSES STARTED

(Permanent Nonfarm Dwelling—Cost Estimated in Thousands of Dollars)

	Number		Cost	
	1955	1954	1955	1954
January	87,600	66,400	$892,794	$618,313
February	89,900	75,200	954,570	701,934
March	113,800	95,200	1,228,834	920,201
April	132,000	107,700	1,434,395	1,106,809
May	137,600	108,500	1,502,901	1,137,562
June	134,800	116,500	1,478,989	1,210,200
July	122,600	116,000	1,242,420	1,213,311
August	123,000	114,300	1,325,162	1,186,019
September	113,000	115,700	1,229,548	1,191,036
October	107,000	110,700	....	1,160,300
November	......	103,600	....	1,083,449
December	......	90,600	....	949,103
Total	1,355,000	1,220,400	....	$12,478,237

YEARLY TOTALS

	Number	Cost		Number	Cost
1955*	1,355,000	$........	1951	1,091,300	$9,800,892
1954	1,220,400	12,478,237	1950	1,396,000	11,788,595
1953	1,103,800	10,488,003	1949	1,025,100	7,702,971
1952	1,127,000	10,208,983	1948	931,600	7,203,119

U. S. Bureau of Labor Statistics. *Estimated.

FABRICATED STRUCTURAL STEEL

Tons

	Orders Placed			Shipments		
	1955	1954	1953	1955	1954	1953
January	241,373	177,760	266,944	225,827	245,629	241,392
February	233,885	266,594	180,882	213,386	253,119	251,137
March	285,434	193,509	258,482	227,789	285,365	266,337
April	270,226	184,982	306,052	242,337	293,532	263,211
May	303,343	199,383	310,517	222,991	253,886	263,806
June	318,150	219,306	232,441	282,325	290,262	274,587
July	369,414	262,782	220,669	219,444	265,181	230,304
August	312,338	193,081	244,607	268,362	272,479	251,109
September	339,461	206,606	217,600	289,128	265,388	255,599
October	308,780	213,497	190,656	283,768	258,447	295,459
November	......	195,550	153,514	......	228,704	257,844
December	......	196,767	204,227	......	223,533	266,926
Total	......	2,509,817	2,786,591	......	3,135,525	3.117.711

	Orders Placed	Shipments
1952	2,503,521	2,664,255
1951	2,931,072	2,702,262

American Institute of Steel Construction.

Industrial Building Cost Index

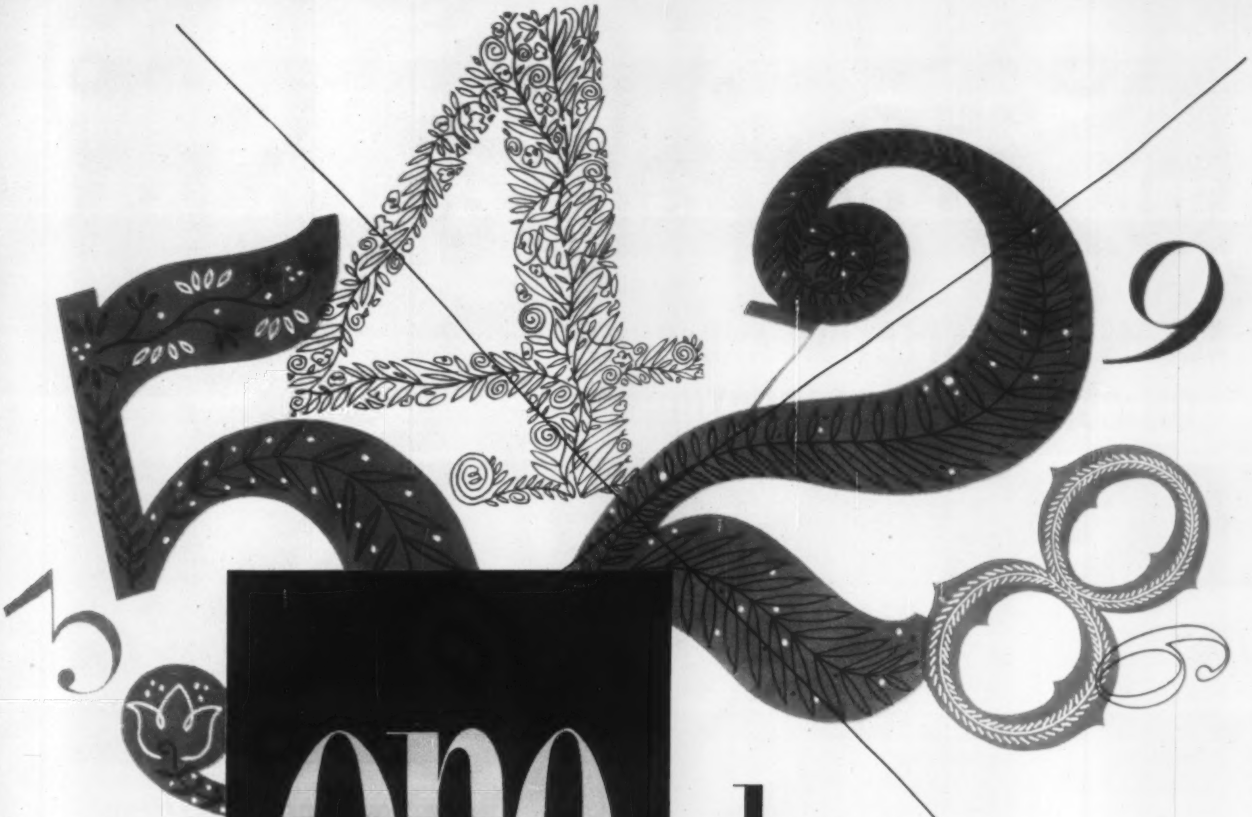
(1914=100)

	1955	1954	1953	1952	1951	1950
First Quarter	396	393	383	374	357	305
Second Quarter	397	393	385	383	373	311
Third Quarter	399	395	392	383	374	330
Fourth Quarter	...	396	392	383	374	339

MONTHLY AVERAGES

1955*	398	1952	381	1949	312	1946	279	1943	225
1954	394	1951	370	1948	321	1945	236	1942	223
1953	388	1950	321	1947	304	1944	227	1941	208

Abertheaw Co. *Estimated.



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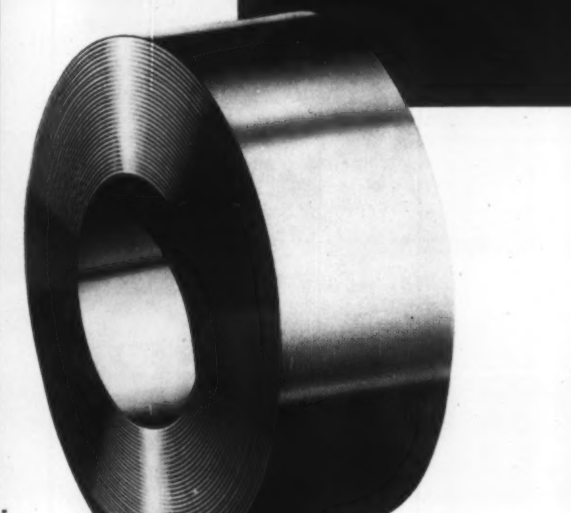

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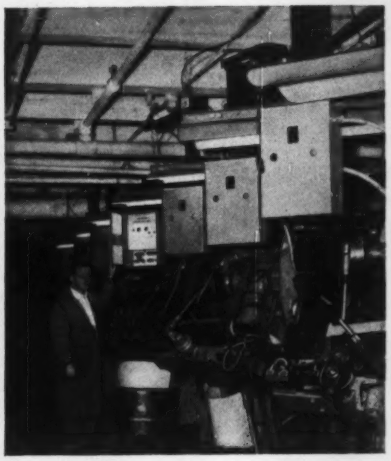
CORPORATION
CARNEGIE, PENNSYLVANIA

Sperry

ultrasonic inspection news

AUTOMATIC INSPECTION AND CONTROL ON CONTINUOUS PRODUCTION LINE

Continuous inspection of steel tubing and strip at production speeds is now an accomplished fact with the new Sperry Ultrasonic Reflectoscope® and RA attachment. This unit scans material traveling at high speeds and registers the presence of both internal and surface defects. Far more thorough than the human eye, it provides for both defect recording and signaling in addition to continuous inspection. Designed to incorporate signal lights or alarm bells, as well as automatic marking and machine cut-off units, the Sperry Reflectoscope and RA attachment is a flexible, accurate instrument which opens a new area to more effective cost-cutting quality control.



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A punch press attachment, which detects the slightest overloads caused by pile-ups, misfeeds, tool dullness, misalignment, the Sperry Protectron minimizes tool and die damage by warning signals and actuation of control devices. The Protectron also cuts costly equipment damage and keeps all automatic machines running without close attention. With Protectron on guard, one man can safely and easily operate several machines at once.

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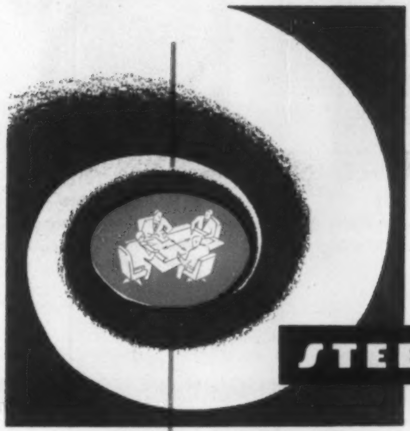

STEEL's FORUM ON

Technical Progress

The thinking of metalworking men today is weaving the pattern for tomorrow. For this long look, 273 metalworking experts pool their thoughts for STEEL

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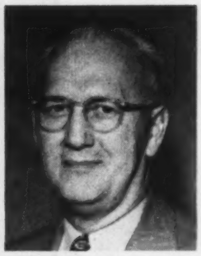
P. S. SAVAGE
Vice President, Donner-Hanna Coke Corp., Buffalo, N. Y.

G. E. KOPETZ
Vice President, Chemical Plants Div. Blaw-Knox Co., Pittsburgh


W. M. PATTERSON
Special Consultant, Allegheny Ludlum Steel Corp. Brackenridge, Pa.

H. E. ROWEN
General Manager, Dwight-Lloyd Div. McDowell Co. Inc., Cleveland

STEELMAKING

FORUM ON TECHNICAL PROGRESS

More emphasis on sintering . . . taconite should hit 4 million tons this year . . . all-basic open hearth is looking up . . . two more companies pick oxygen converter process . . . more open hearths of 500 to 600 tons planned . . .

Mr. Savage . . .

Extensive growth in chemical-type coke oven capacity is inevitable. Activity in the coke oven building industry will be accelerated by the replacement of many old ovens in the next ten years. With the steel industry operating at almost 100 per cent of capacity, all chemical-type coke ovens seem to be fully occupied.

The acute coke shortage that was expected has been tempered by better coke rates in blast furnaces and foundries. Reason: More extensive use of high grade ores, better preparation of burden and the higher grade of metallurgical coal available for coke making.

The trend in oven design has been to build rugged, economically designed units, with emphasis on coke rather than coal chemicals. This trend will continue for some time to come, even to the extent of building beehive ovens to meet peak load demand.

Mr. Kopetz . . .

A perennial problem in steelmaking, the disposal and treatment of waste pickle liquor, is near solution. Developments take three directions: 1. Recovery of the metal and conversion of the acid to products suitable for sale. 2. Complete recovery and re-use of the ingredients in the spent pickle liquor. 3. Improved neutralization.

Serious consideration is being given to the reaction of coke oven gas with pickle liquor to produce ammonium sulphate for sale, and to recover iron oxide for feeding the blast furnaces. The Blaw-Knox-Ruthner process for complete pickle liquor recovery has now been developed to the point where a practical solution is available on an economic basis. Improved neutralization processes use controlled oxidation to produce a filterable sludge.

It appears that research will soon culminate in the installation of facilities which will handle spent liquors from both large and small plants satisfactorily.

Mr. Patterson . . .

Vacuum or gas-controlled atmosphere melting has been known for many years but has always been done in small units. There are several ways to do it.

1. In the induction furnace. The furnace mold is enclosed in a vacuum. Up to now, production melting in this type furnace has been limited to about 1000-lb heats.

2. The Bochumer Verein processes. The ladle is placed in vacuum and evacuated, then taken out and the contents teemed normally in air; or a heat is poured from a ladle in air into a ladle in vacuum, then taken out and teemed in air; or the mold is placed in vacuum, then taken out and teemed in air; or the mold is placed in vacuum and by means of seals, the ladle is placed on top of the vacuum container; as teeming takes place, the vacuum works on the stream and metal in the mold. Single ingots up to 150 tons have been cast by this procedure.

3. The consumable electrode process. It is used to produce molybdenum, titanium, zirconium and other special metals and is a method which we at Allegheny Ludlum are using. An ingot of exact analysis, high-grade superalloy, previously melted and cast in air is used as an electrode. Current flows through the electrode, and the material passes through the arc at about 8500°F in a vacuum to be redeposited as an ingot below. No refractory crucible is used.

Mr. Rowen . . .

Sintering is becoming a planned part of the full thermal reaction of the blast furnace. Reductions in high-grade coke requirements and better control of the furnace have made this procedure good economy. Many furnaces are working toward a 100-percent sinter burden.

A realization of the importance of

M. W. LIGHTNER
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U. S .Steel Corp., Pittsburgh

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Laboratory Div. Head, Process Metallurgy, Linde Air Products Co. Newark, N. J.

F. M. CASHIN
Vice President, Kaiser Aluminum & Chemical Corp., Oakland, Calif.

R. E. BIRCH
Director of Research, Harbison-Walker Refractories Co., Pittsburgh

proper materials handling, feed proportioning and placement of the charge on the grates is becoming evident. The McDowell Flying Saucer type pelletizing mixer is showing evidence of wide acceptance, owing to its high efficiency, low power and maintenance costs.

There is an increasing awareness of the cost of handling false or leakage air and the necessity of using positive-contact lubricated seal members. With control of air leakage, recirculation for gas enrichment and control of burning rates, the recovery of heat formerly lost to atmosphere is available. The sintering machine is becoming a producer of high-grade sulphur, rich sulphur dioxide and excellent iron sinter from otherwise troublesome pyrite ores.

Mr. Lightner . . .

The commercial production of taconite concentrates marks a new era in raw-material procurement for the manufacture of iron and steel. The next few years will see attention directed toward determination of the best taconite agglomerate for highest blast-furnace production and lowest coke rate.

Projected expansion of facilities to sinter ore fines indicates it will not be many years until nearly all blast furnaces will be fed a beneficiated burden. Blast furnace operators probably will prefer the iron oxide agglomerate which is most reducible and which degrades the least into fines within the stock column.

Coal preparation and handling methods to produce coke which will maintain its size and reduce breeze to a minimum will be employed. In increasing quantities, coke will be produced from coals washed to reduce the sulphur and ash content and properly crushed and blended with other coals or suitable coke strengtheners. It is highly probable that the petrographic constituents in coals may soon be used to predict coking characteristics.

Mr. Kurzinski . . .

How to raise output with existing facilities will hold the attention of steel producers during 1956. One method is to improve the burning efficiency of fuels in open-hearth operations. A new technique now under development shows promise.

It involves a burner design based on the operation of jet engines. A small amount of fuel is burned with air in a chamber of the burner. The high-temperature, high-velocity gases formed are then used to atomize the main liquid fuel stream in open-hearth operation. Use of this technique for atomizing fuel eliminates the necessity for "heat-robbing" steam. The fuel is not only atomized, but vaporized and partially cracked to provide higher heat radiation levels.

The expanding application of oxygen-natural gas flames to the hot top heating of large alloy steel ingots may also become increasingly important during 1956. Results indicate yield increases averaging about 6 per cent, with improved ingot soundness.

Mr. Cashin . . .

Significant progress is anticipated in the development of all-basic, open-hearth roofs. Improved brick formulation and methods of suspension make this a reality. Increased use will be made of basic brick for checker settings in open-hearth furnaces. Used here, basic brick means a more efficient heat exchanger. The use of basic brick for both roof and checker settings could permit the steelmaker to get higher operating temperatures more economically.

The top-blown oxygen converter process is becoming an important factor in steelmaking. The environment for refractories needed for this process is in many ways radically different from those of the electric or open-hearth steel furnace. Steel furnace refractories must be re-evaluated for these changed conditions.

The forthcoming round of expansion in steel capacity will include the redesign and enlargement of hearths, utilizing new, high-purity hearth and subhearth materials.

Mr. Birch . . .

Economic proof of the all-basic roof for open-hearth furnaces continues as a long-time goal of greatest importance. The all-basic open hearth at Keystone Steel & Wire Co. continues to operate at higher rates and greater efficiency than the standard furnaces in the same shop. Refractory advances have shown up in greater furnace life, and it is evident that the second main roof will outlast the first.

Higher operating temperatures in all-basic operation extend to the underlying regenerators. This has led to tests with advanced types of basic refractories as checker brick. The outstanding refractory for this application is a type of forsterite brick, which is used in the glass industry for similar service. Cyclic

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Asst. Vice President, Operations
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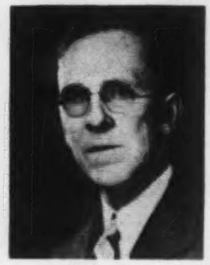
E. W. DAVIS
E. W. Davis Works, Reserve
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Great Lakes Steel Corp., Detroit

H. S. SCHAUFUS
Chief Metallurgical Engineer
Vanadium Corp. of America
Cambridge, O.

conditions of temperature and atmosphere which accompany periodic furnace reversals are often disruptive to other basic refractories. These spinel-bonded forsterite brick are stabilized mineralogically.

Their use has also extended to standard, open-hearth furnaces, marked by higher than normal regenerator temperatures. Still others are experimenting with forsterite checkers for an entirely different reason. It has been found that the dust carried over from the furnace does not affect this basic refractory. The plugging of flues by dust and slag is minimized.

Mr. King . . .

The use of the top-blown oxygen converter process continues to interest steelmakers. Two more plants are expected to use it as a supplement to open-hearth ingot capacity. That will mean the process will have four advocates for the production of low carbon steels, three in America and one in Canada.

Plans are under way for the installation of a substantial number of large, top-charged electric furnaces with adequate power input for the production of carbon and alloy steels. Many open-hearth plants are being modernized, with heat sizes materially increased. Increasing use of mechanical equipment and faster rebuilding have given greater furnace availability. The over-all result has been a substantial increase in output from the same furnaces.

Plans are under way for a number of new open-hearth plants, in most cases involving heats of 300 tons and greater. Increased use is being made of oxygen to expedite the process. Completion of ingot expansion programs will add materially to the present ingot capacity of this country.

Mr. Davis . . .

Taconite concentrate production in 1955 was well over the 1-million-ton mark. The E. W. Davis Works of the Reserve Mining Co. will get into full production this year, so that taconite production in 1956 should crowd 4 million tons. By 1958, production should be nearly 10 million tons.

Taconite is the magic word in northern Minnesota. Between Reserve and Pickands-Mather, $500 million is being spent in an area previously averaging a population of less than 1 person per square mile.

Many persons have the mistaken idea that if it were not for taconite, the poor old Mesabi would be about washed up. This is far from the truth. There are 850 million tons of ore left on the Mesabi. Standard ores will continue to be produced there, although at a somewhat declining rate, for perhaps 50 years. Taconite will simply make up for this natural decline, maintaining shipments at about the present level.

Mr. Kadell . . .

Pressure for more steel has convinced the industry of the need to expand capacity 2 to 3 million tons a year for the next ten. This will involve an annual investment of about $1 billion—the greater part of which must come from earnings and depreciation charges.

Constructing entirely new capacity entails high investment costs. The emphasis for the next several years will be on altering existing facilities for increased productivity.

Much study is being given to the design and construction of open hearths (area and depth, checker chamber design, input for faster heat time, charging methods, preparation of scrap for shorter charging time, etc.). Considerable attention is also being given refractories, aiming at longer furnace life.

More ingot capacity naturally means more pig iron. The prospect of steel scrap prices remaining high accentuates the need for greater blast furnace output. Every effort is being made to increase output from existing furnaces. During relining periods, blast furnaces are being enlarged. Furnace operating practice is being studied closely for greater output. Much is being done in beneficiating ores to increase output and, along with that, reduce the consumption of coke and limestone per ton of hot metal produced.

Mr. Schaufus . . .

Emphasis is on the development of ferroalloys to assist in making steels with greater soundness, lower gas content and less harmful impurities and segregation.

This means ferroalloys with special characteristics, such as greater purity, higher concentration, specific combinations and higher recovery of desired elements, improved solubility, most favorable specific gravity, strong reactivity with solid, liquid and gaseous steel impurities and some exothermic alloys. It will also mean less expensive alloys and, finally, some which will compensate for strategic types whose availability is restricted.

A few developments of interest are modifications in iron-chromium-silicon alloys, ferrosilicon alloys lower in minor elements, ferrotitanium with increased titanium content and reclaim products from nickel-bearing waste products. In the iron industry there will be further need for alloys

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Kaiser Engineers, Oakland, Calif.

D. T. ROGERS
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Dept., Jones & Laughlin Steel Corp.
Pittsburgh

J. M. CROCKETT
Manager, Metallurgical Section
Air Reduction Sales Co., New York

H. W. MCQUAID
Consultant
Cleveland

or compounds to improve present methods of desulphurization of blast furnace and cupola iron, for most effective nodulizing and inoculation of cast iron and for the production of alloy cast irons.

Mr. Holmquist . . .

Leaded steels are being used extensively in industry. Total tonnage has increased sharply in the last few years and will continue to do so in the future. About 25 per cent of Copperweld's capacity is being taken by leaded steels. We're working toward a capacity that will be 50 per cent of our total.

Basically, the purpose for adding lead to steel is increased machinability. The presence of 0.15 to 0.35 per cent lead will result in increases in machinability of 30 to 100 per cent, with corresponding increases in tool life and finer finishes.

Lead-treated steels are made in both the carbon and alloy grades. Leaded steels for forging will come into their own, as more and more consumers of forgings realize that these steels offer definite advantages in reducing machining costs.

Mr. Austin . . .

Steel produced in oxygen converter vessels, both in the U. S. and abroad, has more than justified the claims of lower cost and high quality. This process has already reached an estimated 1.7 million annual tons of the world's production.

With new steelmaking capacity now costing in the area of $300 per ingot ton, the oxygen converter process is one answer to the problem of lowering this figure. It also increases return on capital investment by reducing conversion costs.

In recent months, considerable interest has been shown in oxygen converter plants coupled with cupolas which employ a hot blast as a source of hot metal instead of the conventional blast furnace. Such plants reduce capital investment required for steelmaking facilities.

Mr. Rogers . . .

An important advance in hot extrusion has been the favorable result obtained by combining the process with cold drawing, particularly in the production of small sections. By following hot extrusion with cold drawing, a section may be produced that represents practically a finished part. Many parts now being made from castings, forgings or machining from solid bar stock can be replaced at substantial savings by hot-extruded, cold-drawn sections.

Hot extrusion is designed primarily to produce specialty items; it makes available a wide range of shapes.

At present, both ferrous and nonferrous, high-resistant alloys are being extruded hot. They include titanium, Zircalloy, stainless steel and classified materials developed for the national defense program.

Mr. Crockett . . .

Re-evaluation of steel conditioning methods has been prompted by the high production rate of mills. This has emphasized the importance of large-capacity hand equipment for scarfing slabs and billets.

The oxygen-fuel gas method of hot topping ingots has been improved by developing burners for large ingots.

Work on the carbide injection process for external desulphurization of blast-furnace iron has resulted in better equipment. The process will remove sulphur from high sulphur casts. Whether it will be economical for integrated steel mills will have to be determined by full-scale tests in individual mills.

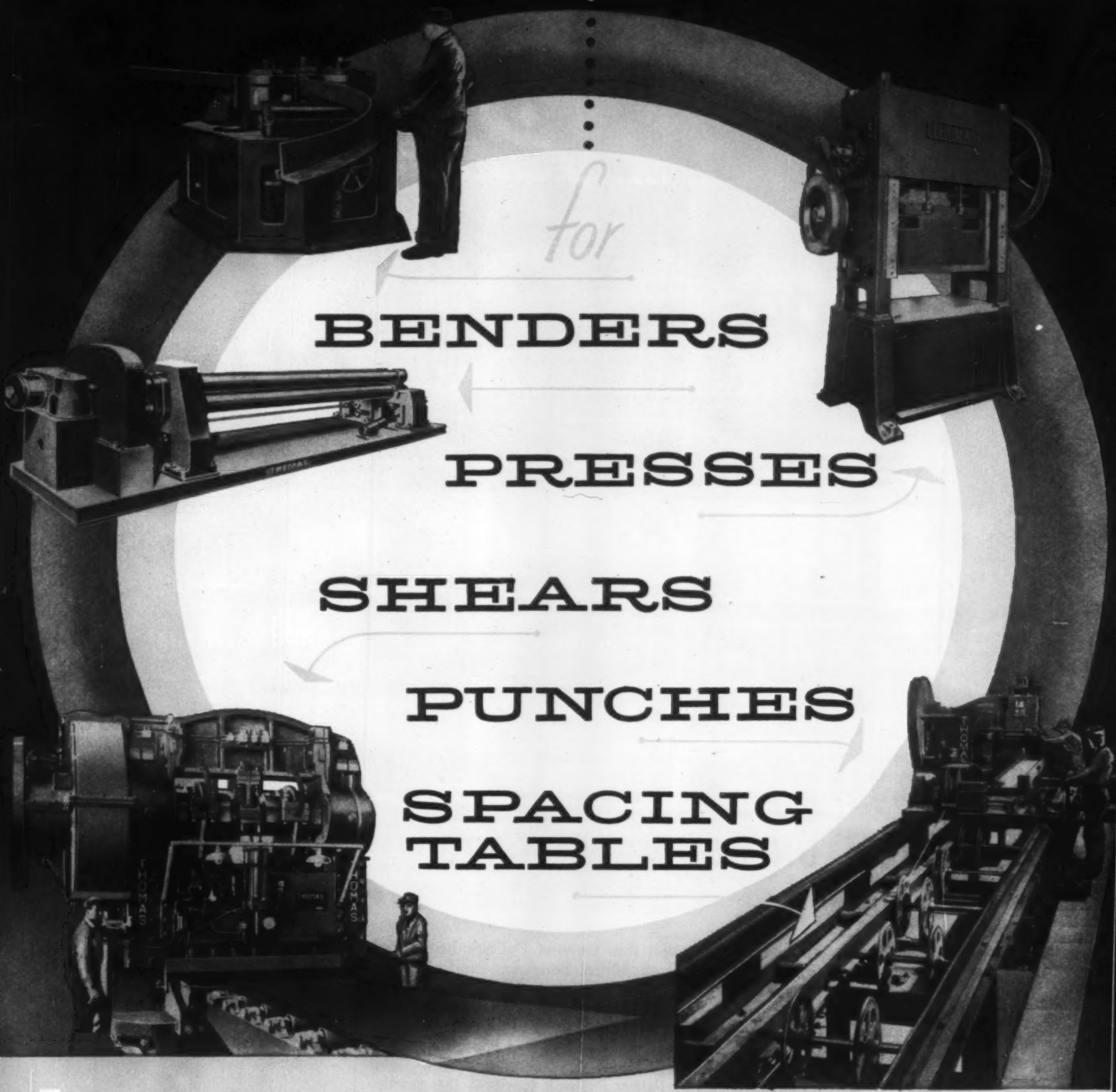
Mr. Mc Quaid . . .

Revolutionary changes are here which will change the whole technology and economics of the steel mill. The prime economic factors will be ore concentration, scrap price and hot metal cost stabilization, oxygen and hydrogen production costs and the sudden obsolescence of the basic, open-hearth furnace as a major production unit.

Tremendous instability in the raw material picture, combined with a constantly increasing demand for an improved finished product, will make the economic operation of any but a really modern steel mill a difficult task—especially in the production of the fine-grained, aluminum-killed, plain-carbon and low-alloy grades.

The concentration of ore to eliminate nonmetallics close to the source will be found to be worthwhile, especially in the developing a high purity charge for the special requirement carbon and alloy grades. This as hot metal will fit well into the combination with tonnage oxygen in the over-blown bessemer and with a basic treatment to reduce phos-

THE TREND IS TO THOMAS



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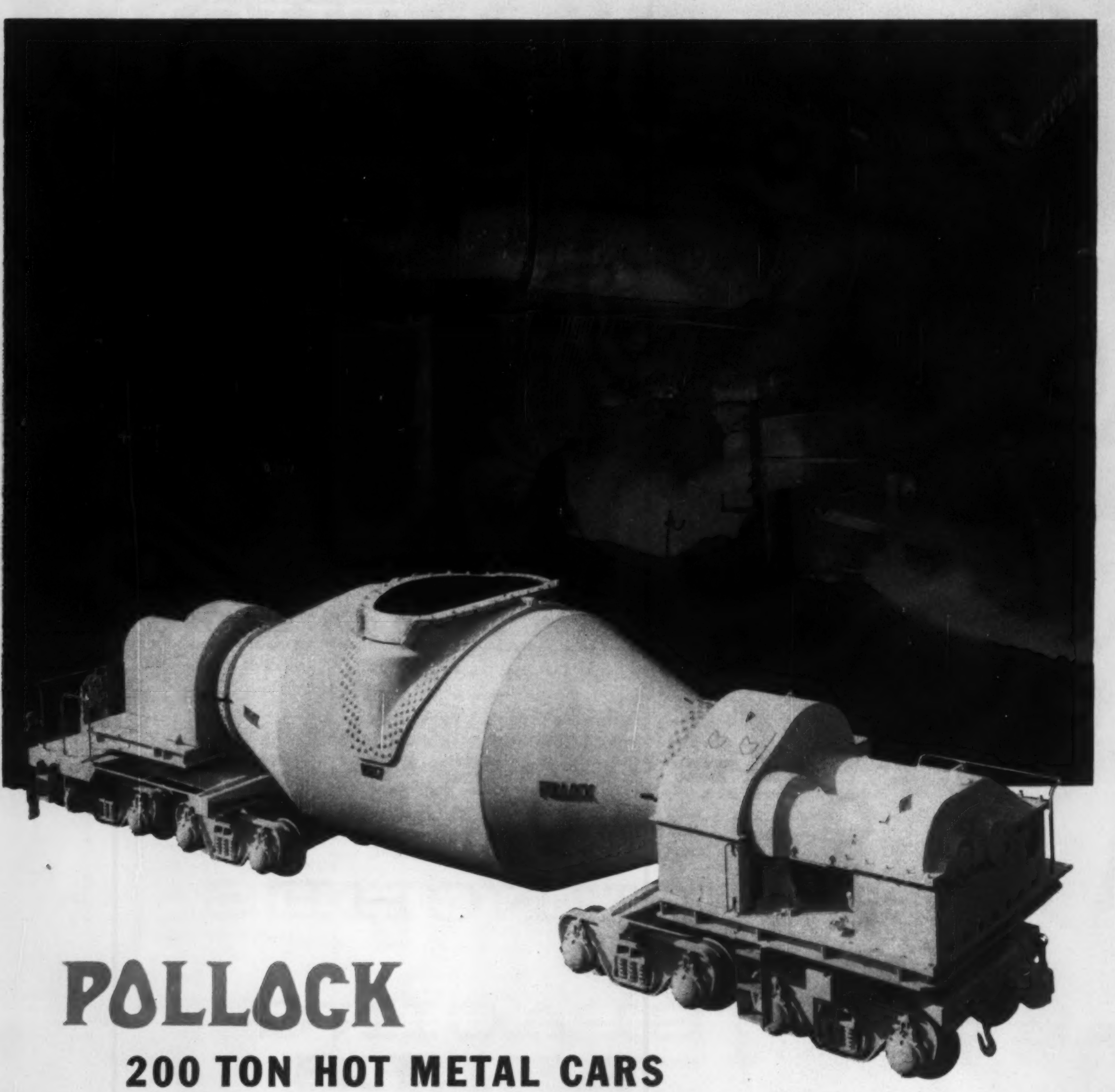

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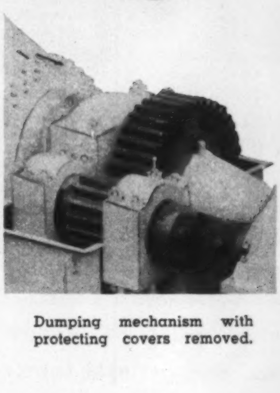

Dumping mechanism with protecting covers removed.

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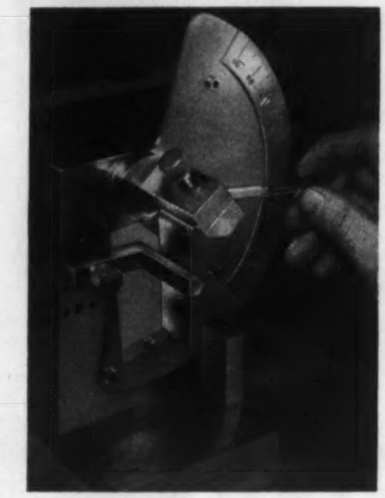

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Somers Brass Company, Inc.
WATERBURY, CONN.

LYLE JOHNSON
Chief Engineer
McLouth Steel Corp., Detroit

phorus and sulphur to desired working limits. The result will be difficult competition for the standard, basic open hearth to overcome, owing to the improved economics and physical properties of the low-nitrogen, oxygen-blown product.

Mr. Johnson . . .

The first installation of oxygen steel equipment in the U. S. at McLouth Steel Corporation's Trenton, Mich., plant completed its initial year of operation on Dec. 17, 1955.

Original production goals have been equaled and surpassed. Management is pleased with the quality of steel produced. As anticipated, nitrogen contents are under 0.0025. The gas cleaning system operates at better than 99.9 per cent efficiency.

The only remaining difficulty is vessel refractory life. Various linings have been tested under full production conditions. Results indicate that the best of these linings still are not satisfactory. The company is reconsidering installing equipment to make refractory materials.

Mr. Barnes . . .

Increased attention is being given to ore beneficiation to improve blast furnace performance. Agglomerated taconite concentrates are becoming available in larger quantities. Sintering of the fines in direct shipping ores is increasing rapidly, with a trend toward a completely agglomerated blast furnace burden. Layer charging, ore bedding, better screening and sizing of coke and limestone are being increasingly used to reduce coke rates and increase furnace production.

Large, open-hearth furnaces built during the recent expansion program present major materials handling

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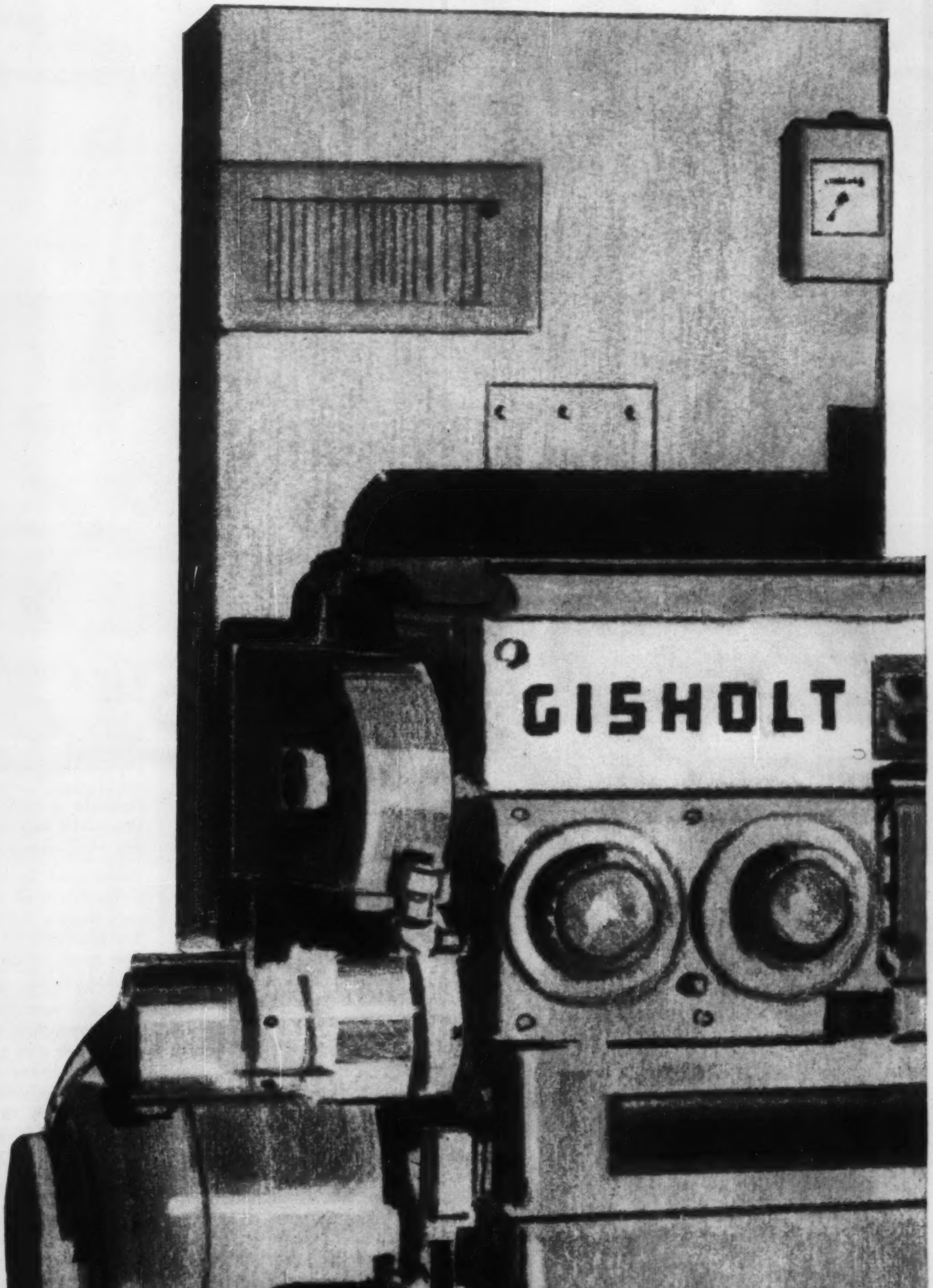
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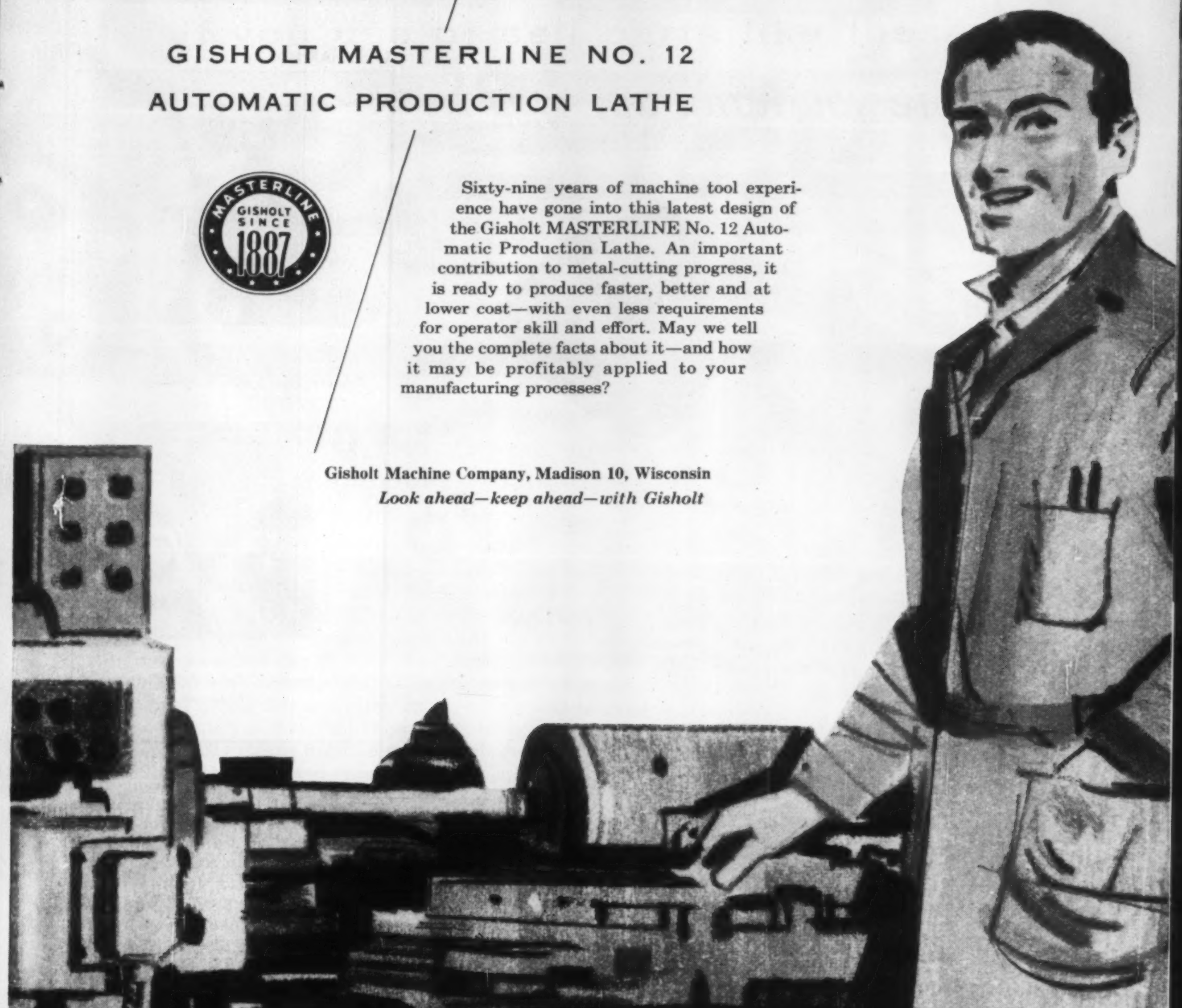

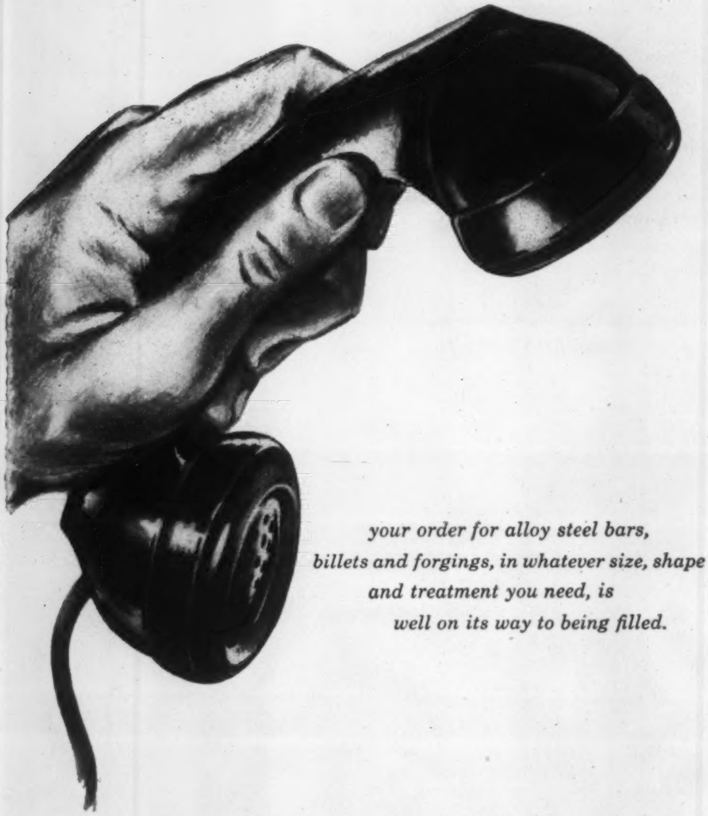

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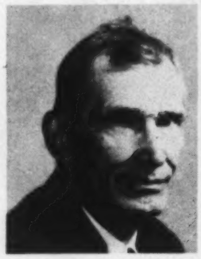


H. C. BARNES
Consulting Engineer
Armco Steel Corp., Middletown, O.

R. P. HEUER
Vice President, General Refractories Co., Philadelphia

problems. Much study is being given to stockyard layout, with provision for setoff tracks for storing loaded drags until needed. A new open-hearth charging method uses 50-ton tilting scrap cars to replace the small, pan-charging buggies. It uses a supercharger in combination with a conventional charging machine, and does not require any changes in the usual open-hearth furnace door and charging track arrangement.

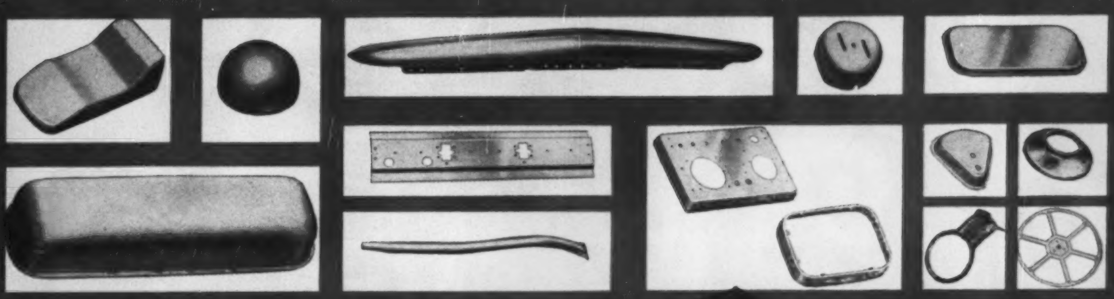
Mr. Heuer . . .

Use of basic refractories in open-hearth furnaces will increase during 1956. Two reasons: First, the great demand for steel, pointing up the need of increased productivity. Second, improvements given with a new type basic brick.

Increased use of all-basic main roofs for open hearths is expected. All-basic furnaces in operation demonstrated that increased yearly productivity of 10 to 20 per cent can be had with a cost per ton no greater than that of silica-roofed furnaces.

The use of a new type basic brick has increased basic roof life by 50 per cent or more over former brick. This brings refractory costs below those for silica furnaces. Furnace life is also increased. It looks like

if you use or sell parts like these...



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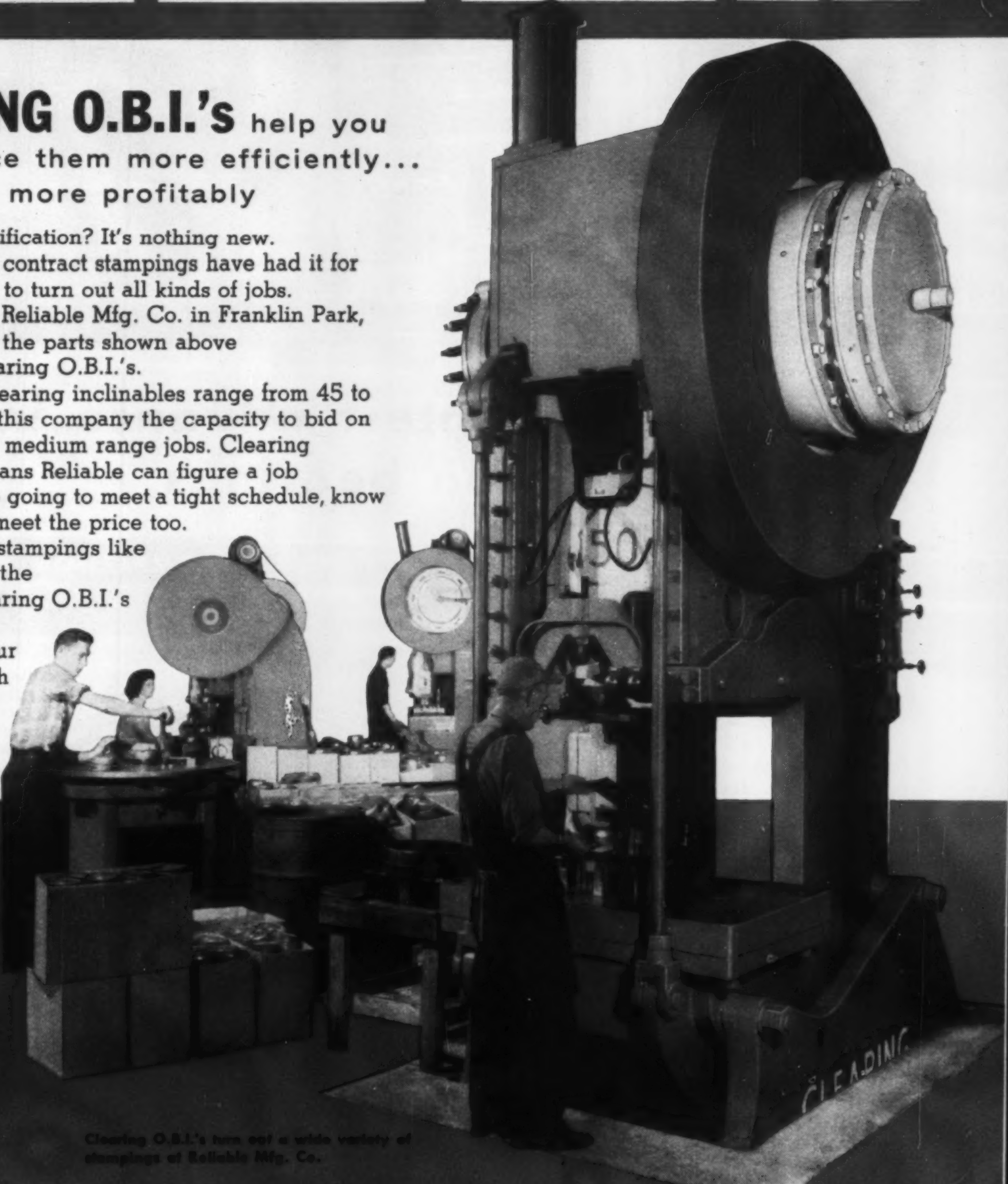
Talk about diversification? It's nothing new. Manufacturers of contract stampings have had it for years. They have to turn out all kinds of jobs. For example, the Reliable Mfg. Co. in Franklin Park, Illinois produced the parts shown above on their four Clearing O.B.I.'s.

Reliable's Clearing inclinables range from 45 to 150 tons, giving this company the capacity to bid on a great variety of medium range jobs. Clearing dependability means Reliable can figure a job and know they're going to meet a tight schedule, know they're going to meet the price too.

If you make stampings like these, you'll find the efficiency of Clearing O.B.I.'s pays off in the clinches. Talk your problem over with a Clearing sales engineer. Call us today.



Clearing O.B.I.'s turn out a wide variety of stampings at Reliable Mfg. Co.

Write for new Clearing booklet—"Thinking about a better way to do the job."

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THE WAY TO EFFICIENT MASS PRODUCTION

CLEARING MACHINE CORPORATION *division of U. S. INDUSTRIES, INC.*

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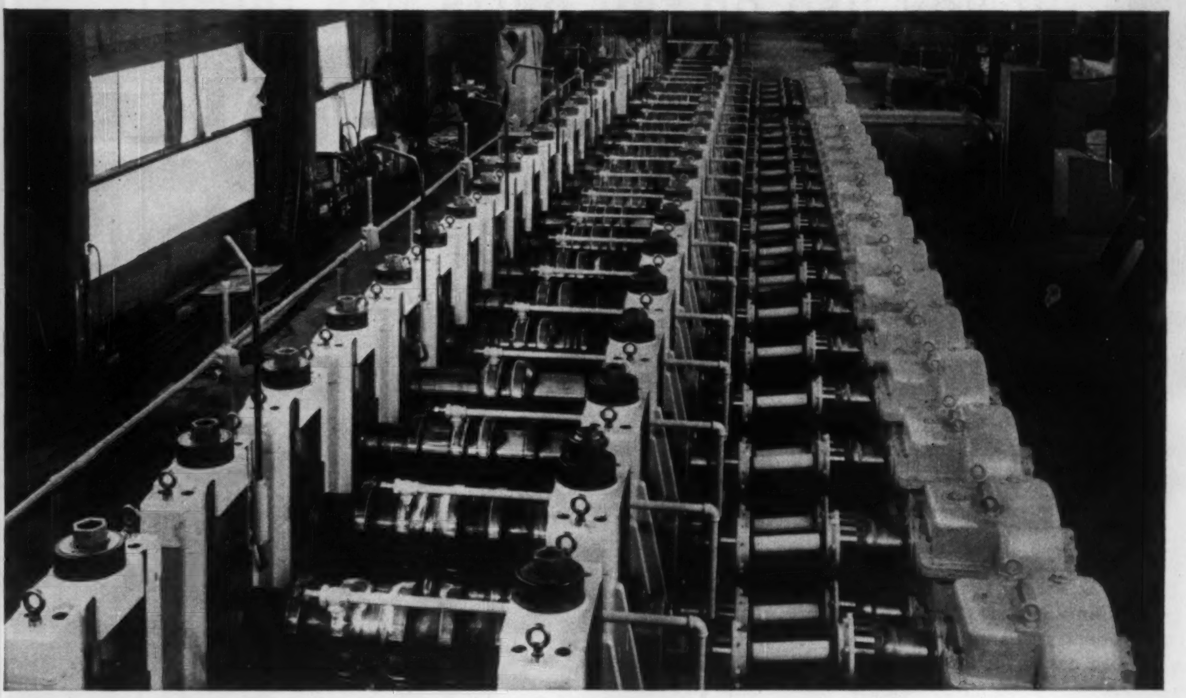

Here is the greatest advance in rolling since anti-friction bearings

Constant velocity universal joints provide four profit-making improvements by:

- **Allowing stepped-up rolling speeds**
- **Reducing mill down-time**
- **Increasing size range of mills because Rzeppa Joints provide smooth *operating* angles of 15° or more**
- **Providing better surface finishes**

Pictured is the most advanced and largest cold forming mill in the world—developed by the American Roller Die Corporation.

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The Gear Grinding Machine Company

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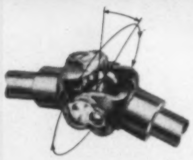
Manufacturers of
- **Fully Automatic Gear Grinding Machines**
- **THE DETROIT SCREWMATIC 750**

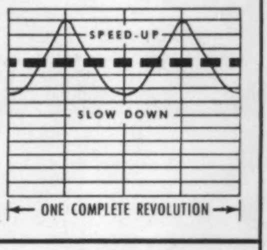
COMPARISON OF OPERATION

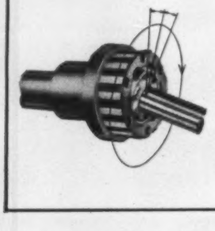
Rzeppa Versus Pin or Slipper-Type.



During rotation at a given angle, pin or slipper-type joint speeds up, slows down twice during one revolution.

Solid line shows speed variation for one revolution of pin or slipper-type joint at a critical angle. Note constant velocity of 100% for Rzeppa Joint (dotted line).





Due to its construction features, the Rzeppa Joint always transmits a smooth flow of power even at unbalanced angles. The standard joint cannot meet this test without involved compensating measures.

H. R. LOXTERMAN
Manager, Steel Plant Equipment Dept., Blaw-Knox Co., Pittsburgh

some furnaces will operate for a year without rebuilding.

Two additional all-basic furnaces are scheduled for construction during early 1956, and it is expected that more will be built before the year ends.

Mr. Loxterman . . .

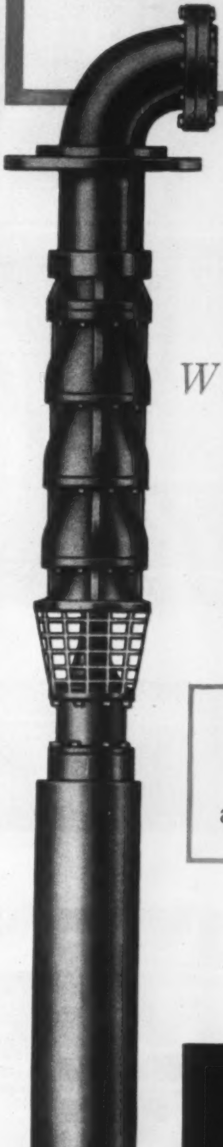
Because of the tremendous demand for steel, another expansion of primary steel capacity is bound to take place in the immediate future. Several new open-hearth and electric furnaces will be constructed, and, at least, two more installations of the oxygen-lance process will be made.

In the new construction, emphasis is expected to be placed on much larger furnaces, with some open hearths being in the 500-to-600-ton range, and tapping into two ladles. Several single-ladle furnaces will be over 300 tons. Many of the new electrics will have shells over 20 ft in diameter. Charging equipment and charging boxes are being increased in size to speed up charging. One plant in the Midwest is changing over to 60-cu-ft charging boxes—the largest ever used, and another plant is probably going to even 65-cu-ft boxes.

Mr. Cline . . .

Mechanical blast descaling of slabs, billets and structural steel should expand rapidly. Pioneer installations have proved the process workable.

Economic data from these first installations are most impressive. With slabs and billets, blast descaling saves much in conditioning time; grinding and/or scarfing is kept to a minimum. With structural steel, galvani-



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BOOSTER PUMPS

Layne & Bowler's half-a-century of experience in the design, engineering and manufacturing of vertical pumps, and the know-how of General Electric in the electric motor field *are now joined to produce the most advanced Submersible Booster Pumps made.* Sizes from 5 to 125 H.P.

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For invisible, noiseless operation!
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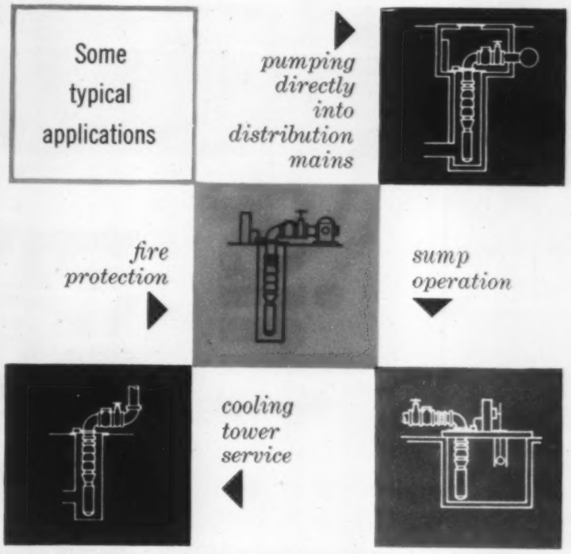
For dependability in any weather!
For maximum use of minimum space!
For maintenance-free performance, without adjustment or lubrication!


Some typical applications
pumping directly into distribution mains
fire protection
sump operation
cooling tower service

Send today for new bulletin containing description of pump and motor features, material specifications, selection tables and application data. Ask for bulletin R-115

LAYNE & BOWLER VERTI-LINE PUMPS

Verti-Line Pumps are the exclusive products of
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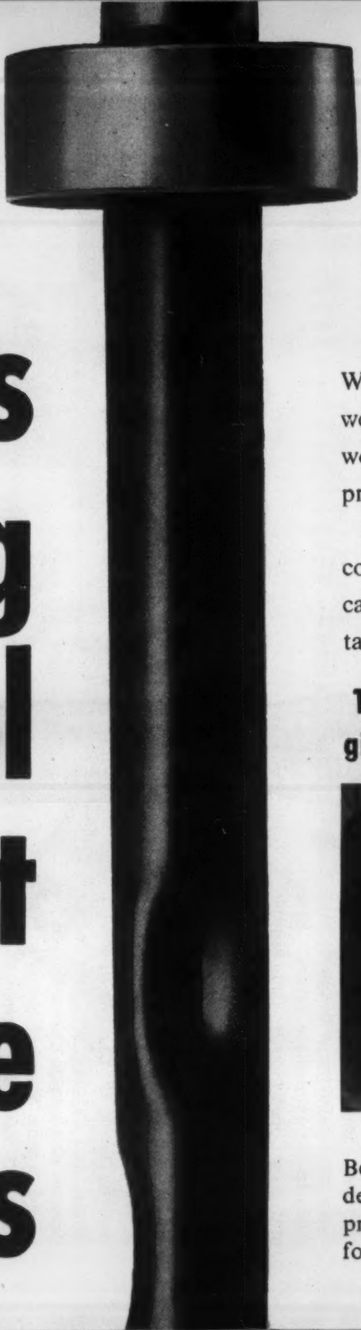
2943 VAIL AVENUE • LOS ANGELES 22, CALIFORNIA

We'd like to show our vertical tube vertically. Do you mind turning the magazine?

this Lindberg Vertical Radiant Tube increases

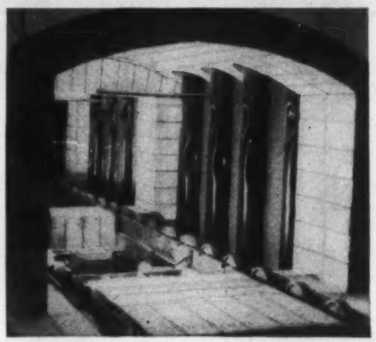


A better way to apply heat to metal

When metal needs heat, Lindberg furnaces with the new Lindberg lightweight vertical radiant tube offer a better way to apply it. Industry the world over is finding that Lindberg furnaces with this new vertical tube provide advantages no other type of furnace can give.

Whatever type or size of furnace fits your production needs, from gigantic continuous pusher-type to the small batch-type furnace, Lindberg engineers can develop exactly the right equipment for you, embodying all the advantages of this revolutionary new vertical radiant tube.

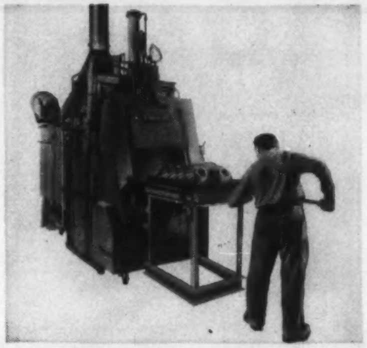
The Lindberg vertical tube gives you these advantages



Improved Performance

Because of Lindberg's revolutionary design, this tube (patent applied for) provides a new level of furnace performance. The secret lies in the new

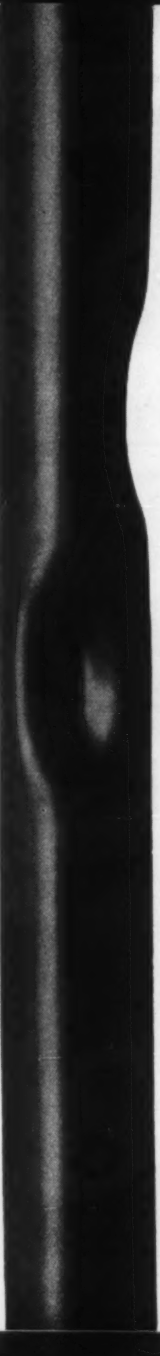
Typical Lindberg Vertical Tube Furnaces



Lindberg gas-fired vertical radiant tube carburizing and carbonitriding furnace. The Lindberg vertical tube is ideal for these heat treating processes which require rapid uniform heating.

furnace efficiency and lowers costs

This scale reproduction is exactly one-fourth actual size.



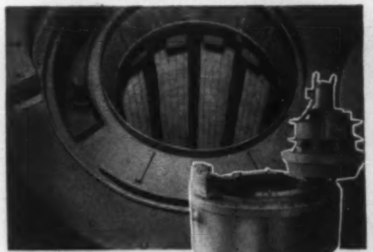
Lindberg tube's "dimples." Here's how they work—in the radiant tube a central stream of mixed air-and-gas is surrounded by a cylindrical stream of air alone and combustion occurs in the area between these two streams. The "dimples" create eddies in the streams accelerating combustion and maintaining even temperatures along the entire tube.

Maximum Dependability

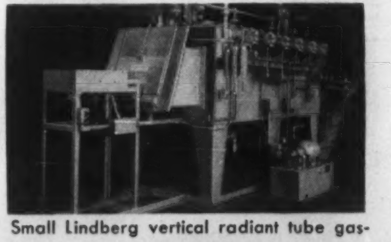
This Lindberg tube will operate at maximum efficiency for a longer period of time. The special green silicone enamel, a Lindberg exclusive, gives greatest possible resistance to carbon penetration and greatly prolongs tube's operational life. Vertical position eliminates soot deposit inherent in horizontal tubes with resultant temperature increases at points of sooting. Lindberg tubes work effectively longer.

New Economy in Operation

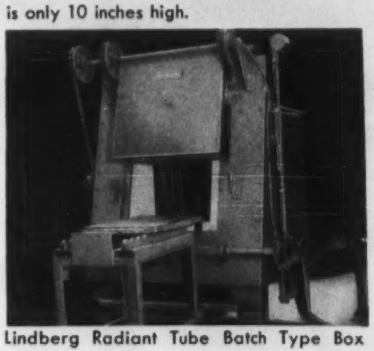
With Lindberg vertical radiant tubes the bulk and bend problems of old-fashioned horizontal tubes are eliminated. Tubes are just 59 inches long and weigh only 29 pounds. No costly furnace shut-downs and no high labor and material cost for tube change. Turn off the furnace, lift out the old tube, put in the new one. Literally, a matter of minutes. Savings in space and fuel costs, too.



Lindberg vertical radiant tube pit carburizing furnace. Note small amount of space required for tubes.



Small Lindberg vertical radiant tube gas-fired hydraulic pusher type carburizing furnace. In this installation heating chamber is only 10 inches high.



Lindberg Radiant Tube Batch Type Box Furnace. Even small furnaces can be heated efficiently with radiant tubes.

Lindberg Field Representatives in 21 cities are ready to work with you for the improvement of your heat treating processes. Consult classified section of phone book or write us direct.

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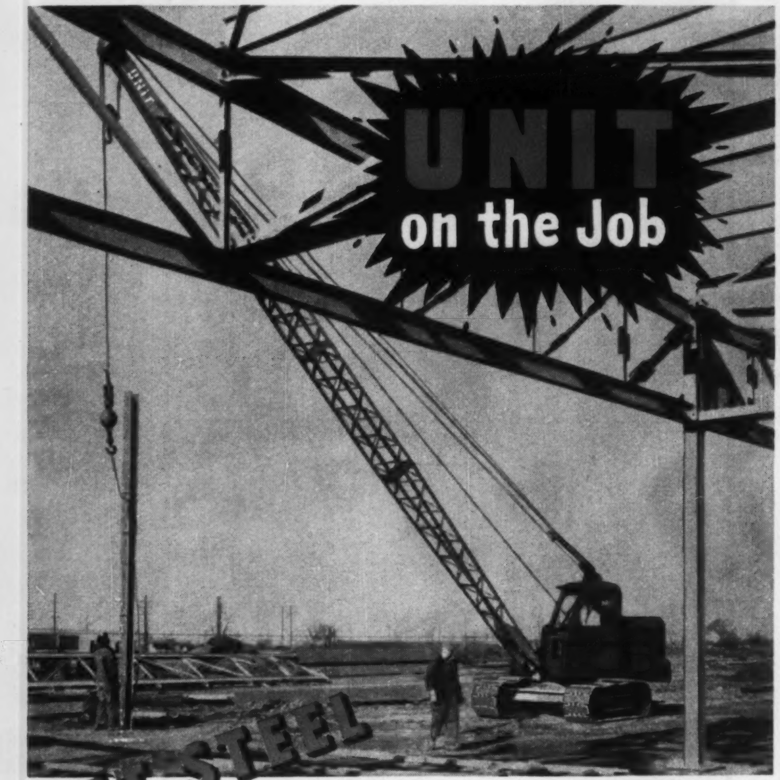

SET STEEL - *Easy and Fast with* **UNIT**

Lifting, carrying and spotting steel girders into the exact position requires STABILITY — FLEXIBILITY and PERFECT CONTROL. A UNIT Crane gives you all these features . . . and more. Extra Long Crawlers — Multiple Hinged Shoes — Wide Axles and Hook Rollers provide perfect stability. Smooth accurate control of boom and hoist lines permits precision handling. UNIT'S FULL VISION CAB gives the operator excellent visibility . . . makes steel setting jobs easier and faster. UNIT equipment can be quickly and easily converted to handle a wide variety of work. To speed up your steel construction, investigate UNIT. Write for literature.

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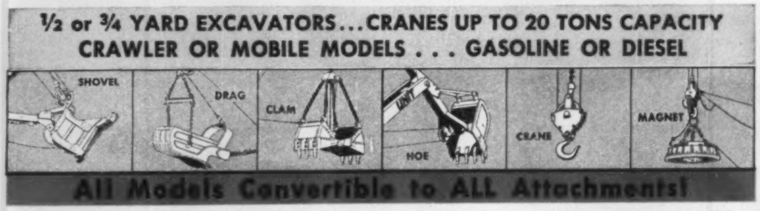
6521 WEST BURNHAM STREET • MILWAUKEE 14, WISCONSIN, U. S. A.

½ or ¾ YARD EXCAVATORS . . . CRANES UP TO 20 TONS CAPACITY
CRAWLER OR MOBILE MODELS . . . GASOLINE OR DIESEL



All Models Convertible to ALL Attachments!

A 7236-2/3 PC

C. R. CLINE
Engineering Asst. to President
Wheelabrator Corp.
Mishawaka, Ind.

H. N. BARRETT JR.
Vice President, Sales
Basic Refractories Inc., Cleveland

zation can be performed or paint coatings applied without prior pickling.

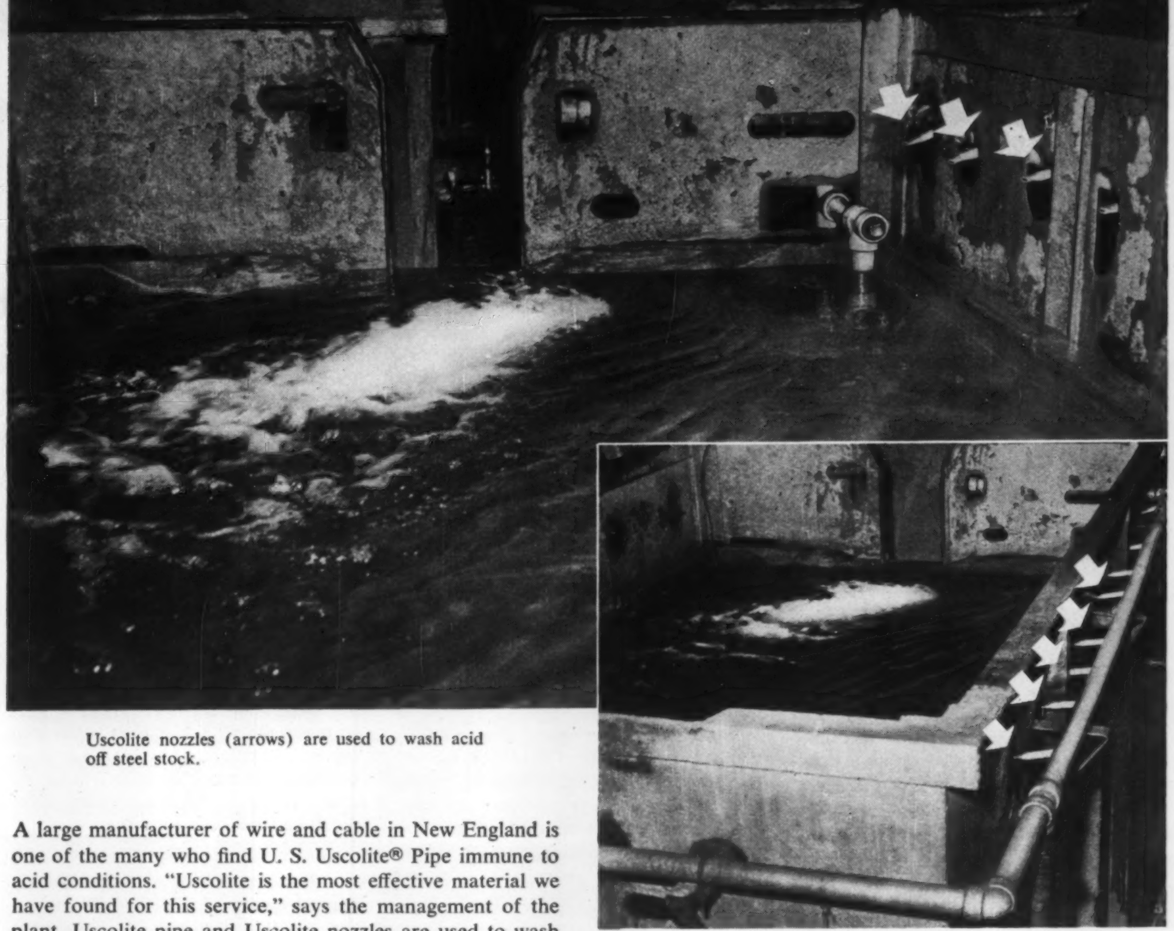
New trends have developed in established mechanical descaling of sheet and strip. Processors are using the method for preparing bonding surfaces after forming and welding sheet. Porcelain enamelers so far have been leaders in this trend.

Mr. Barrett . . .

A new wet mix gun will handle any refractory composition that can be put through dry mix guns, and with predetermined water contents ranging from 6 to 25 per cent. This greatly expands the use of gun refractories in the open hearth. It is possible to shoot a furnace at any stage of the heat cycle without cutting off the fuel.

The new equipment extends the life of backwalls, frontwalls, etc., through routine maintenance, with no penalty on production rates. It also answers the need for a tool to pneumatically pipe tapholes. Major hot repairs to banks and flat made with the gun using chemically bonded, special magnesia refractories are dense and well consolidated. These repairs take no more time than is required for short-cut methods that frequently result in "repeat" jobs and damage to the balance of the hearth.

FOR AN ACID CONDITION, THERE'S NOTHING LIKE
U. S. Uscolite Plastic Pipe



Uscolite nozzles (arrows) are used to wash acid off steel stock.

A large manufacturer of wire and cable in New England is one of the many who find U. S. Uscolite® Pipe immune to acid conditions. "Uscolite is the most effective material we have found for this service," says the management of the plant. Uscolite pipe and Uscolite nozzles are used to wash off acid after cable and wire are immersed in pickling baths—for two big reasons:

(1) Uscolite is immune to corrosion from the splash-drip and spray off the steel stock as it comes from the pickling bath.

(2) Uscolite nozzles not only last far, far longer than metal nozzles, but they also require no clean-out.

Uscolite piping is a product of United States Rubber Company. Both its interior *and* exterior are resistant to acids, salts, alkalies, gases. Despite Uscolite's great impact strength, it is surprisingly light in weight. You can also order it in pipe fittings and valves.

Close-up of Uscolite pipe which carries water to the Uscolite nozzles (arrows). The tanks are lined with U. S. corrosion-resistant Permobond rubber lining.

Whether ordering completely new piping, or getting replacements, specify U. S. Uscolite. Get in touch with any of the 27 "U. S." District Sales Offices, or write us at Rockefeller Center, New York 20, N. Y.

Uscolite pipe and fittings are made in the broadest and largest line of stock sizes on the market. Sizes follow:
● Molded fittings in ½" through 4" I.P.S. ● Molded flanges ½" to 6" I.P.S. ● ½" to 3" Uscolite diaphragm valve (Hills-McCanna). ● Pipe in standard wall dimensions and extra heavy wall dimensions in ½" through 6" pipe sizes.

US RUBBER

Mechanical Goods Division

United States Rubber

J. M. KENNEDY
Chairman, Revere Copper & Brass Co., New York

R. J. NEKERVIS
Chief Metallurgical Engineer, Tin Research Institute
Columbus, O.

JERRY SINGLETON
Executive Secretary, the Magnesium Assn., New York

C. C. LONG
Director of Research
St. Joseph Lead Co., Monaco, Pa.

NONFERROUS METAL PRODUCTION

FORUM ON TECHNICAL PROGRESS

Charging machines at horizontal retort plants increase zinc smelting capacity 10 to 20 per cent . . . titanium mill products will move faster this year . . . output in '55: Wrought magnesium doubled, primary aluminum hit new high . . . effective weight of copper and brass cakes was doubled during rolling . . .

Mr. Kennedy . . .

Current developments relate to doubling the effective weight of cakes, the induction heating of billets prior to extrusion and the use of the multiple draw bench as a tube drawing method.

Solid strip or sheet, containing expandable portions which can be inflated by the user into continuous running lengths of tube of whatever size or space desired, is in production and will have a wide range of uses in heat transfer, refrigeration, air conditioning, etc.

Printed circuit copper is being widely used by the electronics industry. It is supplied to laminators in standard coils of 350 lb, in widths up to 38 in. The gages, 0.0015 and 0.0027, weigh about 1 ounce and 2 ounces per square foot. Easily etched and soldered, it has high conductivity and uniform density.

Mr. Nekervis . . .

The International Tin Agreement and the operation of the Texas Tin Smelter must be acted upon in 1956. Most important to the tin market is what is to become of the 23,000 tons of tin (about 14 per cent of annual world production) now absorbed in the American Strategic Stockpile. If it should be freed during the coming year, it becomes a question of whether the tin regulation plan of the International Tin Agreement will be able to cope with this or smaller surpluses.

The steadily increasing demand for tinplate is helping to keep the world picture bright for the coming year. Tin plating uses 62 per cent of the U. S. consumption of tin and 43 per cent of world consumption. It is likely that this year will surpass record levels as food canners add new products.

The second largest tin consumer, solder, has a bright future in printed circuitry. When such circuits are automatically soldered, practice is to coat the whole circuit with tin solder rather than just the joints.

New uses, such as tin-nickel electrocoating, tin-zinc as a replacement for cadmium coating and the new, high-tin, aluminum-bearing alloys, may help relieve any impending surplus.

Mr. Singleton . . .

For the first time, more than one-half (some 54 per cent) of all magnesium has been used for industrial and consumer applications. The industry has been striving to reach this point and now feels magnesium is on its way to getting general recognition as an important structural metal.

Ingot production for the year was down about 13 per cent. This was less than anticipated. Wrought products passed the 10,000-ton mark for the first time by registering a gain of more than 50 per cent over 1954 totals. Casting output was up some 10 per cent for the year. And for 1956, every indication points to a continued healthy growth.

Mr. Long . . .

Charging machines at horizontal retort plants have increased smelting capacity 10 to 20 per cent. Many machines, including sand slingers, screw injectors, horizontal belts and compressed air devices, have become economical with the advent of higher labor rates.

The furnace, as predicted two years ago, is capable of producing 50 tons of zinc a day. It is a commercial reality, with margin to spare. At least three mechanical ingot casting machines are either in operation or being built.

Demand for Special High Grade continues, with diecasting alone taking over a third of a million tons. Two of the western plants are increasing electrolytic capacity to help meet demand. Increase in general production facilities (about 30 per cent) is being pushed by a leading eastern smelter to help meet the de-

R. DAVISON
Manager, Market Development Div.,
New Jersey Co., New York

WALTER L. FINLAY
Vice President & Manager of
Research, Rem-Cru Titanium Inc.
Midland, Pa.

F. H. VANDENBURGH
Vice President & General Manager
Mallory-Sharon Titanium Corp.
Niles, O.

C. I. VOGEL
Vice President-Sales
Brooks & Perkins, Deroit

mand for specifications metal from continuous galvanizing lines. Favorable fabricating qualities of this hot-dip, galvanized sheet and strip have multiplied end-use possibilities to a point where over 30 continuous lines are producing or are under construction.

Mr. Davison . . .

All-time production records established (1955) in the diecasting and galvanizing industries pushed zinc metal consumption over the 1-million-ton mark—highest in the history of the 107-year-old industry.

Design changes in automobile front and rear ends, calling for larger die-cast parts, are accounting for most of the increased demand. The galvanizing field continues to enjoy peak demands for its zinc-coated steel for roofing, air conditioning equipment, conduits and miscellaneous contractors' products. Such demand, coupled with the development of the continuous galvanizing line, has sent production to unprecedented heights.

Another development which holds considerable promise is the growing appreciation of the merits of zinc in the cathodic protection of steel structures. Zinc as a galvanic anode is taking a more prominent position in the cathodic protection field. By using zinc anodes as corrosion protection for ships, submerged steel structures, pipelines, tanks, underground utility line and industrial plants, substantial savings are promised in materials and maintenance costs.

The high demand for zinc is expected to continue during 1956, and consumers have been assured that there will be enough zinc available to take care of all requirements.

Mr. Finlay . . .

Titanium mill product shipments, after leveling off at 1100 to 1200 tons in 1953, 1954, began to rise in '55. Last year's shipments (an estimated 2000 tons) and filled order books for the first quarter of this year show that titanium is once again on the move.

For 1956, the industry looks forward to higher-strength alloys. Some of these materials will be obtained by heat treating existing grades. New titanium alloys, with improved combinations of properties, are in pilot production and are planned for introduction in 1956.

Mr. Vandenburgh . . .

This promises to be the year titanium comes into its own. Major aircraft and jet engine programs are committed to large scale requirements. This is important to prime contractors and hundreds of aviation subcontractors. Commercial applications, based on titanium's corrosion resistance as well as its lightness and strength, are broadening from development to the production stage in many industries. The improvements have been so great that titanium shipped only a year ago would not meet today's quality standards.

Outstanding improvements in quality levels have been made by the continual development of processing techniques and stricter quality controls. Uniformity of product is much better. For example: We now certify physical properties of unalloyed titanium heats within narrow ranges. Hydrogen and other impurities have been brought within acceptable limits. Much also has been learned about fabrication methods. Titanium's original reputation for difficult machinability is no longer true.

Titanium and titanium alloys now available meet the strict requirements for aviation use. This will spearhead the broad industrial use of this metal.

Mr. Vogel . . .

Magnesium, while maintaining its place in military applications, has moved into substantially larger commercial usage in the past year. Lightweight magnesium luggage is gaining wide consumer acceptance. The sales volume of magnesium ladders, scaffolds, ramps, dockboards, etc., also is rising.

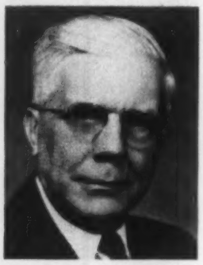
The amount of magnesium used by the U. S. printing industry doubled in 1955. It is being used for photoengravers plate, back-up plate and direct printing, especially on rotary presses, eliminating electrotypes. The availability of automatic etch equipment and new methods of curving rotary press plates have combined to increase use.

Large amounts of magnesium are used (as a reducing agent) in the production of titanium, zirconium and other metals. Magnesium tooling plate, recently introduced, is gaining wide acceptance in the aircraft and automotive industries. Many companies are converting to magnesium checking fixtures to insure easier handling and faster operation.

One of the most important recent

GEORGE PERKINS
General Director, Product Development, Reynolds Metals Co., Louisville

P. P. ZEIGLER
Director, Metallurgical Research
Kaiser Aluminum & Chemical Corp.
Oakland, Calif.



J. L. PATTERSON
General Manager-Fabricating Div.
Aluminum Co. of America, Pittsburgh

T. E. VELTFORT
Manager, Copper & Brass
Research Assn., New York

developments is the introduction of magnesium-thorium wrought alloy HK-31. It's for jet planes and missiles where skin temperatures of 300 to 750°F rule out the use of other magnesium alloys and aluminum. One or more new magnesium alloys with somewhat higher room temperature strength properties probably will be introduced this year.

Mr. Perkins . . .

The tight aluminum markets that were with us throughout the last year were the result of the widespread recognition and acceptance of the metal's basic advantages by the consuming public.

Packaging in aluminum continued its ascendancy on the basis of its advantages: Protection from moisture, sunlight and odors and its eye appeal (for impulse buying). In the automotive field, aluminum is gaining important markets. The refrigeration industry is using more and more aluminum.

The solution of technical and operational problems has permitted the metal to expand its usefulness in the electrical field. The lightweight metal with strength is rapidly becoming a design feature of trains, trucks and trailers.

Mr. Zeigler . . .

An unprecedented annual production of more than 3 billion lb of primary metal failed to satisfy the nation's demand for aluminum and its alloys in 1955. Plans to increase production facilities already have been announced.

The greatest relative increase in the consumption of primary metal was in the production and use of aluminum-base, electrical conductors. Recent introduction of an all-aluminum-alloy transmission cable, as well as other aluminum conductor developments, will further reinforce the accelerated use of the metal in conductors. The elimination of steel cores in older types of transmission cables which use aluminum conductor wires, reduces weight, alternating-current resistance and attendant electrical losses.

STEEL's 1954 Forum mentioned improved melting and casting processes capable of producing a new level of processing ingot quality. Ingots with the new quality level became available in substantial commercial quantities in 1955. This has extended current and potential uses of heavy sheet and plate sections in aircraft construction and has enabled aircraft designers to expand their concepts for future uses of aluminum alloy forgings and extrusions.

Mr. Patterson . . .

The aluminum industry put 1955 on the books as a record year and is further expanding to keep in step with growing demand.

For the fourth year, the nation's primary aluminum production reached a new high, with the 1955 total standing at about 1.54-million tons, compared with the previous year's 1.46-million tons.

Aluminum Co. of America is acknowledging the expanded and diversified markets for aluminum with increases in both primary and fabricated facilities. On the fabricating scene, Alcoa began significant expansion of its aluminum foil capacity during the year. Extrusion capacity was increased, and with the co-operation of the Air Force, the world's largest aluminum plate stretcher was programmed during the year. Facilities for the production of insulated, aluminum electrical conductor line were planned, as was equipment for hot and cold-rolled sheet and plate.

These represent a few major areas of development in production during the year. Many of these and other expansion projects will extend into 1956, providing greater facilities to service the rapidly growing demand for alumium.

Mr. Veltfort . . .

With the rapidly growing importance of electronics, instrumentation and controls in the strongly established trend toward further mechanization and automation in industry, copper and its alloys are finding a great variety of uses. This stems not only from the generally recognized advantageous properties of these metals but also from the great variety of alloys, tempers and finishes which can be furnished. They permit close compliance with the exacting needs dictated by our scientific advances.

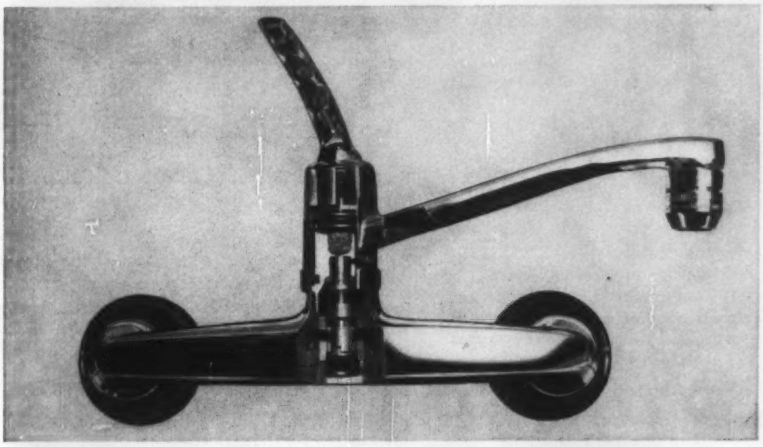
An adequate supply of copper is essential to permit the brass mill industry to satisfy effectively the demand for its products. While the capacity to produce copper has been increasing throughout the world, unfortunate interferences caused by strikes at critical times and the extraordinary direct and indirect requirements for copper for defense and military purposes have kept the supply from catching up with this tremendous demand. At present, the supply available to domestic fabricators is tending toward a balance with the demand. Barring strikes and

BRIDGEPORT BRASS COMPANY

COPPER ALLOY BULLETIN

Bridgeport Brass Co.

Reporting new developments in copper-base alloys and metalworking methods.



Modern, Single-Handle Faucet Relies on Bridgeport Alloys for Precision-Fit Parts

A practical answer to scalded hands at the kitchen sink is the ingenious, precision Moen faucet made by Ravenna Metal Products Corporation, Seattle.

Replacing the traditional valve-and-washer system with a stem and ported-piston assembly, this faucet mixes hot and cold water to temperatures predetermined by the position of its single handle. Precision-fitted parts eliminate washers and assure watertight connections.

Recognizing that a simplified design often requires expert metallurgical and production knowledge to specify the proper materials, Ravenna asked Bridgeport Technical Service for assistance in materials selection.

This new faucet design placed double responsibility on the materials. All had to meet stringent machining requirements. Each finished part had extensive performance specifications. During test runs with conventional alloys, machining difficulties occurred. Then service failures developed, season-cracking among them.

Technical Service studies for Ravenna indicated that certain Bridgeport alloys, made to ASTM specifications with exact tempers and stress relief anneals, would meet all requirements. And, all machined parts could be made by straight machining on Ravenna's standard Warner & Swasey automatics.

For the spray, valve escutcheon and escutcheon nut, specifications stipulated the use of hard-temper Bridgeport Alloy T-64. Supplied in tube form, this high-leaded alloy is ideal for operations involving extensive machining.

For packing nut, spout end, brass body, body nuts, lock nut and jam nut, the specifications called for Ledrite 6 half-hard brass rod. This is a free-cutting alloy uniform in composition. It assures accurate dimensions and minimizes tool wear.

For spout tubing Bridgeport recommended light-drawn Alloy 69, a cartridge brass, highly ductile and well adapted to both cold-working and severe forming operations.

Radically different requirements were necessary for the anchor washer and discs. Here the studies recommended the use of Bridgeport F-3034 10% Phosphor Bronze D because its characteristics facilitated manufacturing and gave desired wear resistance.

In every instance, Ravenna has found that the alloy characteristics essential to manufacture also assure satisfactory service life in the finished product.

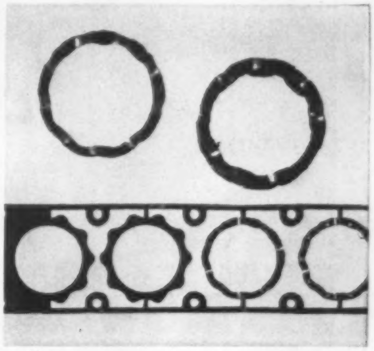
Whenever you plan to simplify or redesign your products, let Bridgeport Technical Service contribute its metallurgical studies and recommendations. This service, available from Bridgeport Sales Offices, can help you achieve manufacturing efficiency and product satisfaction.

Unique Ball Bearings Use Retainer Cages of Bridgeport Brass

Stephens-Adamson Manufacturing Company of Aurora, Illinois, produces the well-known Sealmaster ball bearing unit, widely used in mining, agriculture, textile and heavy-duty applications. Sealmaster bearings are designed to operate under severe atmospheric conditions with a minimum of maintenance.

Unique bearing cages accurately space the balls to distribute radial and thrust loads and at the same time trap and hold grease and prevent its churning. To make these retainer cages, Stephens-Adamson uses Bridgeport F-37 cartridge brass, soft, as recommended by Bridgeport Technical Service.

Smaller cages are made by progressive die operations. Larger cages are press-formed from blanked-out rings, the separate halves being riveted together.



Bridgeport Alloy F-37, developed primarily for the production of artillery shells and small arms cartridges, is a superior material for products which are deep-drawn, spun or progressively machined.

For Sealmaster bearings, Alloy F-37 is supplied in widths up to 9 inches. The easy working qualities of this Bridgeport alloy make it ideal for this application. In other cases, too, there is usually a preferable Bridgeport alloy. Technical Service can help you find it. A call to your nearest Bridgeport Sales Office will make all arrangements.

(4626)

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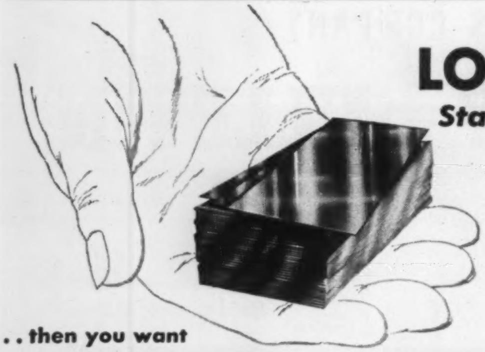

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MicroRold 430 is the least expensive of all stainless types because it does not contain nickel. This results in a 7¾c per pound difference in base price between Type 430 and Type 302, the most popular higher grade stainless. A saving of $155 per ton is possible and is of merit to cost-conscious fabricators.

MicroRold Type 430 sheets are available in thicknesses .005" to .109" with 2B or 2D finishes; and in thicknesses .010" to .109" in No. 3, 4 and 7 finishes.

Send for your copy, "Care and Use of 430 Stainless".

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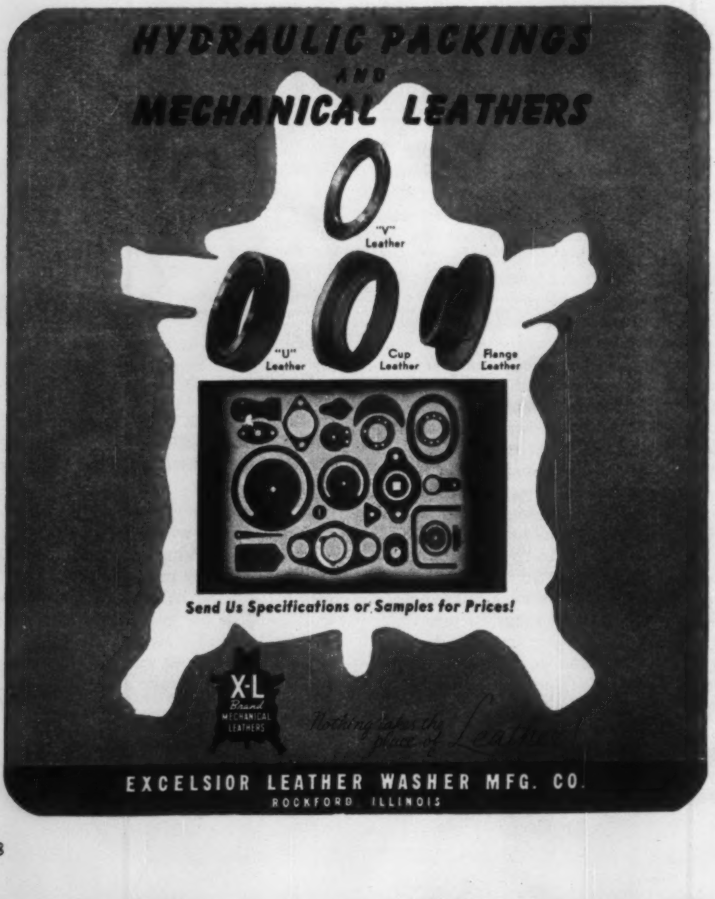
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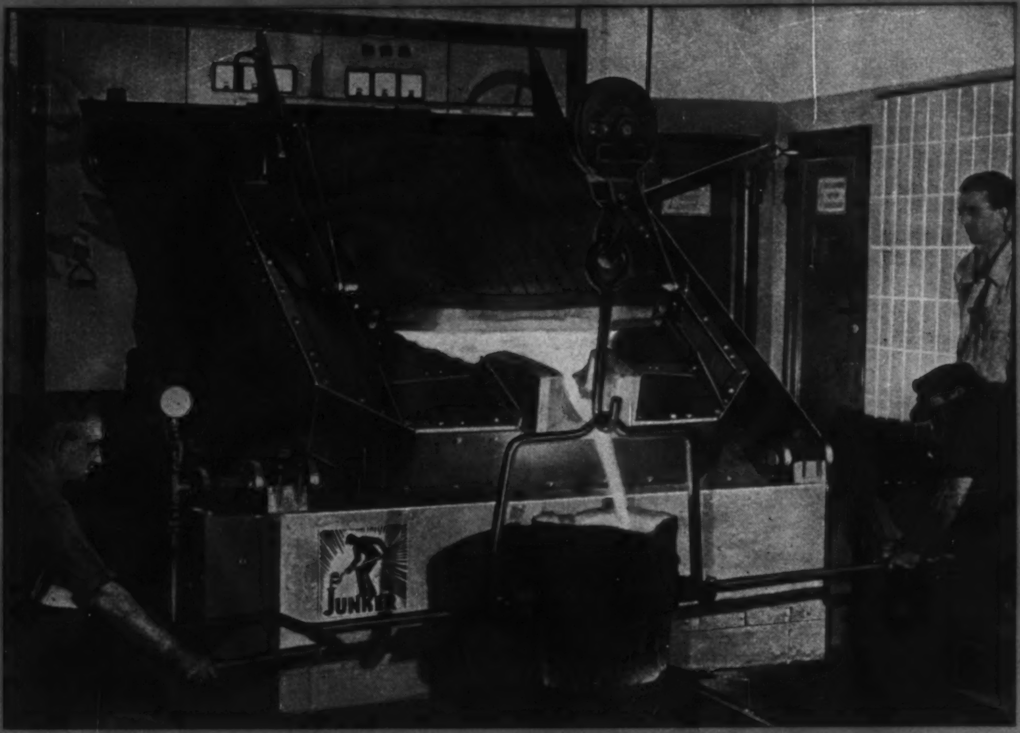
H. W. STEINKRAUS
President, Bridgeport Brass Co.
Bridgeport, Conn.

other emergency situations, the copper supply should presently be sufficient to permit the industry to meet the growing requirements of its customers.

Mr. Steinkraus . . .

Major developments are taking place in the production of copper and copper-base alloys in the form of strip, rod, wire, tube and pipe. They include: 1. Casting: Larger and more powerful electric furnaces are replacing smaller ones (10,000 lb and larger are in the offing). The units will be able to cast bars weighing up to 5000 lb and over. 2. Extrusion: Heavier extrusion presses, more automatic switch gear and a wider range of products are the order of the day. 3. Tube drawing: Multiple draw benches of heavy construction are coming into increasing practice. They draw up to five tubes at a time in lengths of 125 ft or longer in the finished draws. Flexibility is maintained by continuing some smaller equipment. The rivalry between draw benches and draw blocks has been settled in favor of the benches, except for long lengths of small-diameter tubing. 4. Rolling mills: Higher-speed mills which have the reversing feature and handle much larger coils are the latest type being purchased. Preference is running toward 4-high and multiple-roll equipment.

The uses of copper, brass and bronze products are steadily increasing because of improvements in quality and variety. An unsteady world market has disturbed the price structure severely during the last year, but with substantial new ton-



A NEW METALLURGICAL TOOL FOR THE PRODUCTION OF HIGH QUALITY CAST IRON

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The photograph shows a Junker coreless induction furnace for melting and superheating cast iron in a German foundry.

For further information write to

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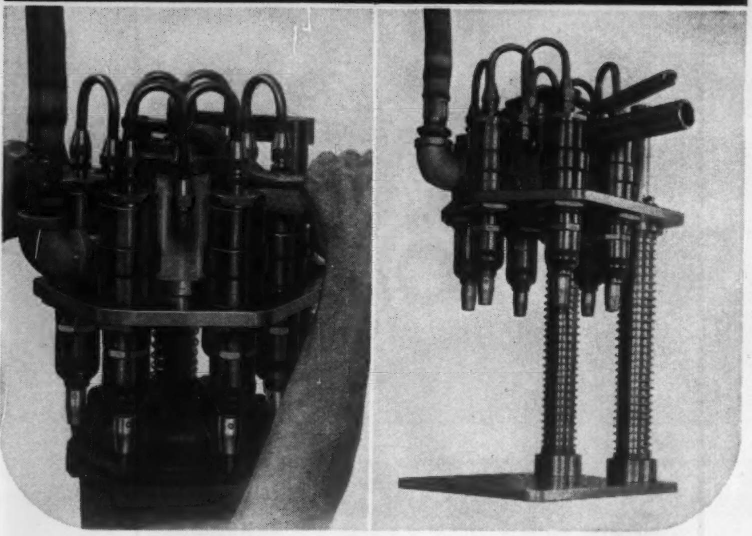
BUCKEYE multiple-unit fastening and drilling tools reduce assembly time and costs on any operation involving two or more fasteners.



Now—an entire assembly operation, where two or more fasteners are used, can be completed in the same time required to drive a single fastener. The savings you can make will increase directly with the number of tools in your Buckeye multiple-unit tool. You decide how many screws or nuts you wish to drive—simultaneously . . . or how many holes you want to drill—simultaneously . . . you're limited only by the air supply available in your plant.

Tools can be positioned to match any horizontal drilling or fastening pattern, and to compensate for any differences in vertical position of screws, nuts or workpiece. A Buckeye multiple-unit tool will drive screws and nuts of different sizes and types . . . will drill holes of different sizes and depths—and do either job simultaneously. Tool capacities, in multiple units, are identical to individual tool capacities.

Buckeye multiple-unit fastening and drilling tools are engineered to your specific requirements. They may be arranged on self-supporting arms, as illustrated, or designed for suspension above the work. Just send a letter or sketch, outlining your assembly operation, or ask to have a Buckeye Tools Sales Engineer visit you. Either way, it costs you nothing to learn how you can step up assembly output and cut assembly costs—simultaneously.

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J. L. KIMBERLEY
Secretary, American
Zinc Institute, New York

nages coming from newer mines and reduced pressure on the market from some directions, it is expected that a more stable market situation will develop during the coming year.

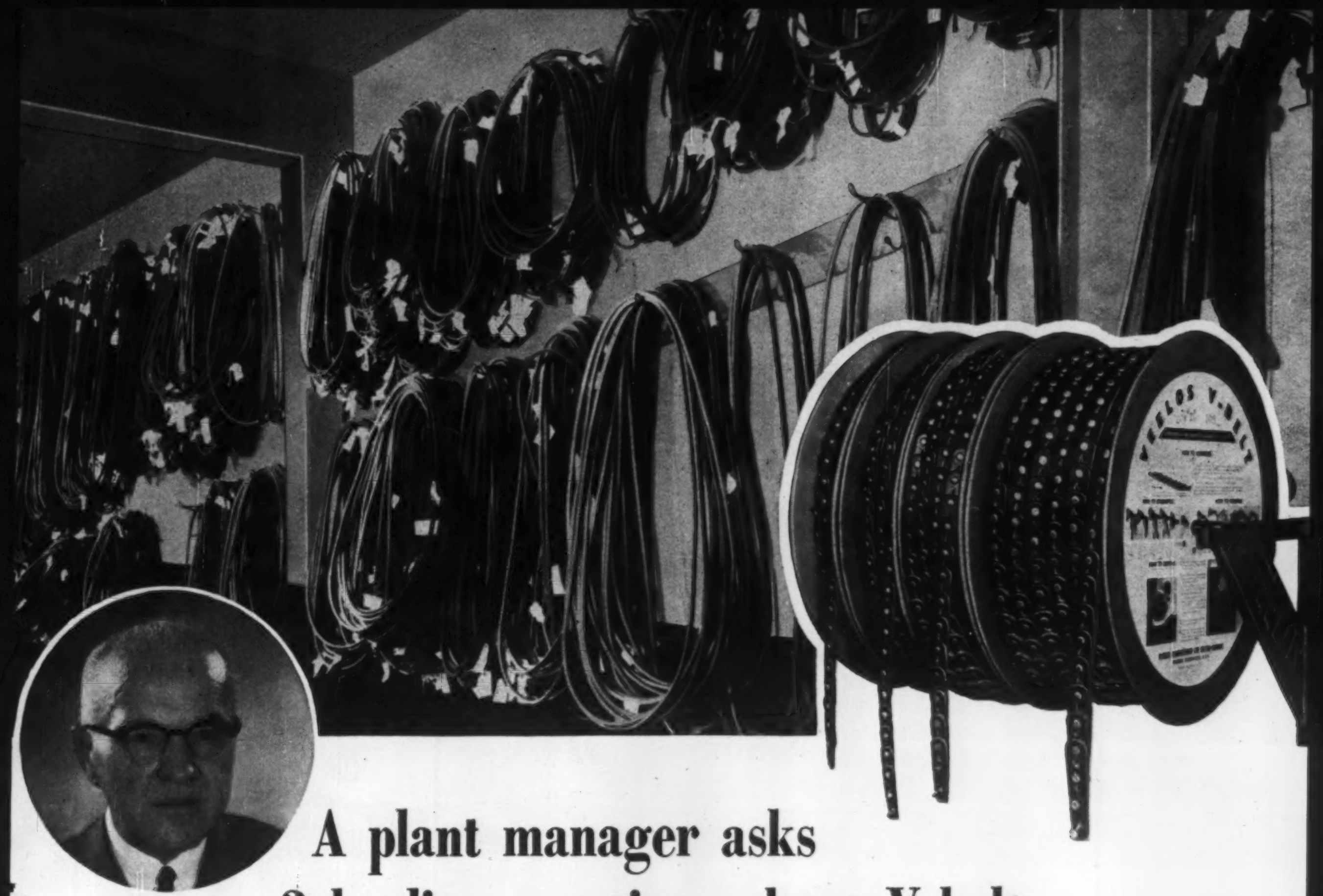
Mr. Kimberley . . .

It is a practical certainty that the year just passed will prove to be the largest ever for zinc smelters in the U. S. Prevailing optimism and the insurance inherent for business in an election year should maintain high levels during 1956. The largest consumers for 1955 are galvanizing (estimate: 430,000 tons) and diecasting (estimate: 380,000 tons).

Galvanizing (all types) has been good and the expansion of steel's continuous lines for galvanizing sheet and strip will result in a solid continuing requirement. During 1955, a record of nearly 3 million tons of galvanized sheet will have been produced. A larger tonnage in 1956 is likely. The superior fabricating characteristics of the continuous line product are constantly making new applications practical and economical.

The merits of zinc for diecasting are demonstrated by a consistently growing demand. Automobiles take 60 to 70 per cent of all zinc diecastings. The 1956 cars are carrying from 10 to 15 per cent more zinc than the 1955 models, which averaged about 50 lb per car.

Last year saw a large increase in general industrial awareness of the importance of preventive maintenance and the need to control corrosion. Zinc, as steel's partner in this field, is increasing its scope. More and more of the materials of con-



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2 "How does Veelos cut installation and down-time?"

Veelos is an *adjustable belt.* With Veelos, there's no tearing down outboard bearings, no resetting, tilting or moving motors to make belt replacement or repairs! And you don't have to replace a complete matched set because of one loose belt—Veelos belts adjust to any length, can be altered by adding or removing links!

3 "How do I eliminate costly belt vibration?"

Install Veelos in place of ordinary belts! Veelos belts are absolutely uniform; every stud and link is identical; every foot of the reel is identical and uniform; they're perfectly balanced. Your Veelos salesman can easily prove to you with a Veelos Vibration Analyzer (tested against any V-belt you might now be using) that Veelos *cuts vibration up to 90%!*

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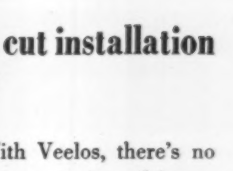

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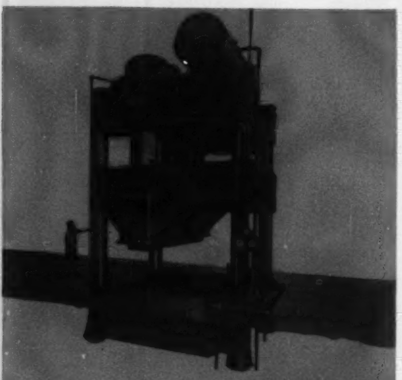

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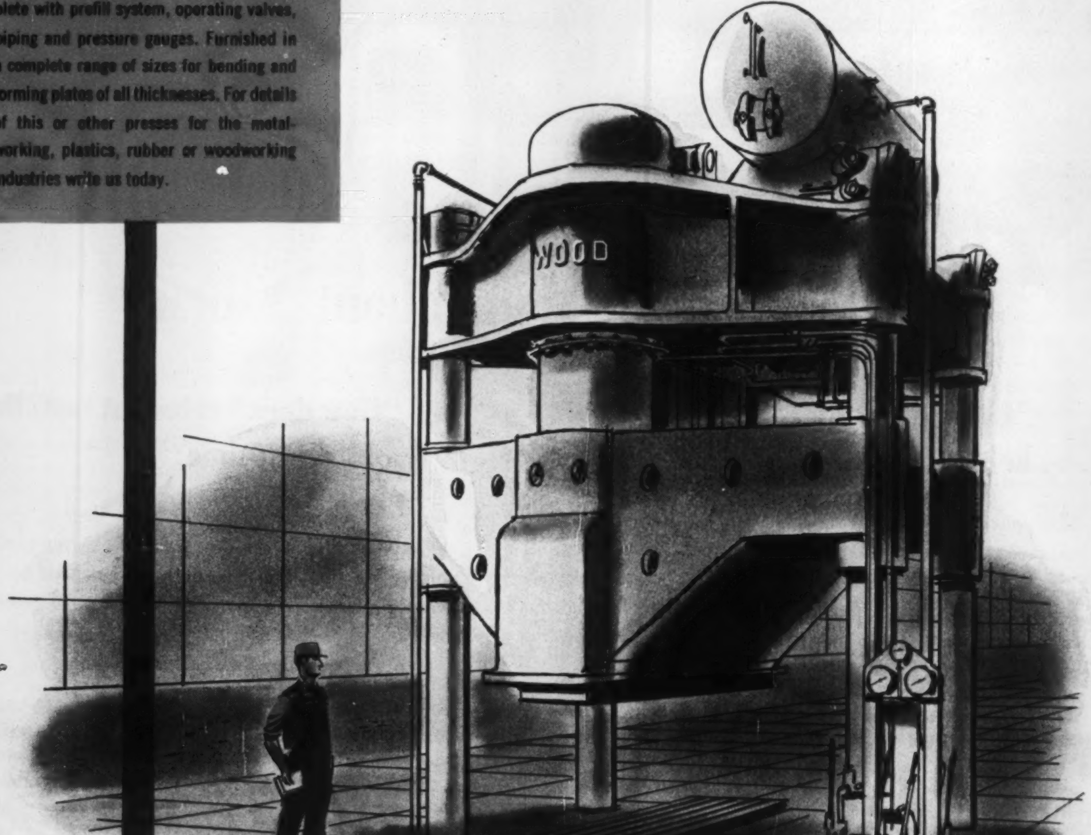

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R. L. ZIEGFELD
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struction are galvanized or protected by zinc anodes.

Near future demands for zinc are such that the industry's capacity for prime western, various in-between grades and special high grade for diecasting must be expanded.

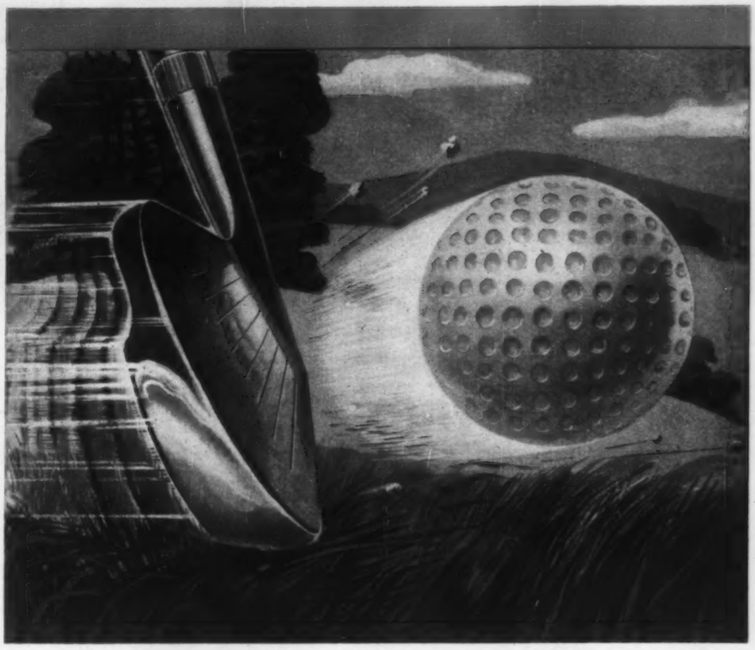
Mr. Ziegfeld . . .

In the storage battery industry much interest has been shown in new grid alloys. It has been found that by substituting small percentages of silver and arsenic (about 0.4 per cent of each) for some of the antimony content, service life has been increased substantially by improving the resistance of positive grids to corrosion.

Five new paint formulations for priming rusted, weathered or treated new galvanized surfaces have been developed by the Red Lead Technical Committee of the Lead Industries Association.

Considerable activity has taken place in applications of porcelain enameled aluminum—a new material made possible by the low fusing temperatures of lead frits. The chief use for porcelain enameled aluminum has been in architectural facing material and curtain-wall construction.

The use of lead in radiation shielding (lead bricks, special castings, leaded glass, etc.) continues to keep pace with the increased growth of the atomic industry, particularly in the handling of radioisotopes and spent fission products. Of interest was the recent development of special lead bricks with a Brinell hardness about four times greater than conventional brick for use where service conditions are severe.



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This lesson from the golf club applies to parts for every kind of machine, tool, and equipment. You can trust forged metal. It increases safety. Because the metal is internally sound as you machine into it, it cuts costs for machining, inspection, and rejections. It is uniform to withstand shock and fatigue. Take full advantage of forgings to improve your product, to cut your costs. Send for the booklets described below, and call in a Forging Engineer, to learn what forgings offer you.

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Dow Chemical Co., Midland, Mich.

W. S. PELLINI
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Naval Research Lab., Washington

J. T. MacKENZIE
Technical Director, American Cast
Iron Pipe Co., Birmingham

J. D. ZAISER
President, Ampco Metal Inc.
Milwaukee

CASTING

FORUM ON TECHNICAL PROGRESS

More mechanization in foundry equipment . . . seek international specifications for gray iron . . . shell process in wider use . . . vacuum casting goes commercial . . . design for casting growing . . . big expansion in diecastings . . .

Mr. Brooks . . .

The trend in aircraft use of magnesium is toward alloys containing rare earths or thorium (they retain good properties in the 600 to 700°F range). But by far the greater part of magnesium aircraft castings still are made from alloys in which aluminum and zinc are the main elements.

One marked trend in aircraft castings is toward thinner walls and more accurate control of dimensions. A few years ago, few castings were made with wall thicknesses less than 3/16-in. Now ⅛-in. walls are commonplace, and even thinner ones are being cast to a limited extent.

The quality of aircraft castings has been increasing steadily. Practically perfect ones are demanded. This quality factor, combined with requirements for thin walls and a smooth surface finish, necessitates careful control of materials and methods.

Mr. Pellini . . .

Vacuum melting and casting is no longer a laboratory tool. The movement to industrial vacuum units of ever increasing size is clear evidence of improved quality of the end item and the economic advantage of the process.

The field is separating into areas, each specific to a particular metal type or problem. Specialty metals, such as titanium, zirconium, tungsten, molybdenum, ductile chromium, ductile vanadium and their alloys, require the utmost from the systems. For certain uses, vacuum melting and casting are absolute musts.

Much attention has been given to the vacuum melting and casting of high-strength steels. While such processing is not a must, benefits are sufficiently attractive to justify its use for special-purpose steels. Remarkable increases in fatigue life of bearings have been obtained because of the increased cleanliness of the material.

Mr. MacKenzie . . .

Nodular iron is the present sensation and will gradually find its place in the family of cast ferrous metals. How to get this structure direct from the cupola probably will be worked out.

If the price of coke keeps going up and that of electric power stays put or goes down, the electric furnace may take over a large part of the tonnage. The cupola is going toward the closed top, water cooled, hot blast, dry blast, with practically no lining, which can be operated with any slag composition desired.

Precision casting in both ceramic and resin-bonded molds will increase. The use of the "wrong side" of the shell in centrifugal casting of pipe and tubing has recently been publicized and probably will replace most of the sand molding for this purpose.

Sand preparation will drift to automatic control of moisture and bond by slurry additions. Core blowing is a sure bet, and mold blowing can't be far behind.

Mr. Zaiser . . .

Wide publicity has been given to the proposed substitution of aluminum for copper by traditionally large users. Copper's erratic price and supply picture is disturbing to foundries and users alike.

The replacement of copper-alloy products by other materials is not possible in the majority of cases. Producers of brass and bronze castings are continuing energetically to develop and improve facilities and products.

The rapidly expanding electronics industry has had some bearing on establishing new uses for brass and bronze castings—largely as current-carrying parts and, in certain instances, for low magnetic characteristics. Hard bronzes are being used increasingly in forming, drawing and

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HARRY M. ST. JOHN
Foundry Consultant
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Chief Metallurgist, General Steel Castings Corp., Eddystone, Pa.

CHARLES W. BRIGGS
Technical & Research Director
Steel Founders' Society of America
Cleveland

bending work on stainless alloys. The expanding chemical industries have generated new uses for corrosion-resistant castings.

Notable changes in the application of copper-base castings have come from the engineer's realization that vast improvements have been made in mechanical properties. There has been a decided swing to use of stronger, tougher alloys, such as the aluminum, manganese and silicon bronzes.

Mr. Schwartz . . .

High operating temperatures and stresses require alloys with super properties. Investment foundries are meeting this challenge by casting intricate hollow shapes for cooling and weight saving characteristics. They are developing vacuum melting techniques which have brought a considerable increase in the physical properties of cobalt and nickel-base alloys.

More complete inspection procedures are being used to control quality. One-million-volt x-rays, improved fluorescent penetrant inspection and electronic magnetic comparators for determining carbon content are required for 100 per cent inspection of all turbine blade parts. To improve fatigue strength characteristics, these castings must be processed so that a fine grain structure (less than ¼-in.) will be obtained.

Many investment foundries are expanding facilities to keep pace with the growing gas turbine industry, and they will also continue to develop better methods and alloys to meet the critical requirements of such future engines.

Mr. St. John . . .

Modern machining techniques require castings to be more nearly perfect than ever before. There must be no lumps; cored holes must be perfect in contour and exactly centered. Finish must be at a minimum, both for high casting yield and for economy in machining.

This means that full advantage must be taken of the latest in molding practice and control of molding sand properties. There is a trend toward harder molds, stronger and more permeable sands, better sand conditioning and use of molding-sand additives in blended rather than natural sands.

New methods, such as shell molding and high-pressure diaphragm molding, have been adopted in part by some larger foundries. They have proved a challenge to conventional molding, which, modified to take advantage of recent developments, has yielded surprising results.

Only a few of the large foundries have done much with automation, but all are making a careful study of methods and equipment to get more pounds of better castings per man-hour. Technology is in the saddle.

Mr. Jenni . . .

The steel castings industry is putting increasing emphasis on research and development. Research studies are furnishing engineers and designers more facts and a broader knowledge of the inherent advantages of steel castings.

Areas in which much progress has been and will be made include: Scientific risering; quality control in melting, in sand preparation and in inspection; sand reclamation; controlled heat treatment; new and improved cleaning room techniques; new processes of molding and coremaking such as shell molding, the carbon dioxide, sodium silicate process and quick drying core oils; new materials; and design studies and product development based on stress analyses and other sound engineering studies.

Our growing economy is opening an expanding market for steel castings. This is marked in electric power production, in construction, in the ever-expanding basic steel industry, in mining, in road building, in the chemical and petroleum industry and in nuclear energy.

Mr. Briggs . . .

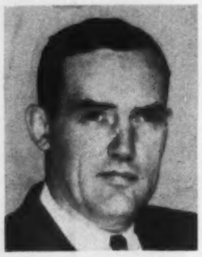
The graphite mold casting process has progressed nicely during the year. Cast steel railroad car wheels are being produced. Other interesting developments being studied by steel foundrymen (either in experimental orders or production castings) are the Glascast molding method, centri-die process and the "D" process of shell molding.

The oxygen steelmaking process (recently installed at Dominion Foundries & Steel Ltd.) has good possibilities in the melting of steel for casting. Being basic lined, the furnace permits phosphorus removal and a good quality of steel is produced.

New welding processes, such as semiautomatic submerged arc and inert-gas shielded arc, are being used to repair weld and to weld steel castings and wrought materials

D. L. LA VELLE
Assistant Manager, Aluminum Dept.
Federated Metals Div., American
Smelting & Refining Co.
Barber, N. J.

JOHN B. CAINE
Technical Consultant to Foundry
Industry, Cincinnati



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Technical Service Engineering
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into composite engineered parts. The tungsten, inert-gas welding process is particularly adaptable to foundry use where special compositions are employed and all weld metal must match the original composition. The foundry can cast the welding electrodes and make homogeneous repairs or welds.

Mr. La Velle . . .

Continuing expansion in automotive applications will account for a large proportion of future growth in the aluminum castings industry. Production of diecastings exceeds the combined output of sand and permanent mold castings and is a trend that will continue. Expanding use of appliances, do-it-yourself tools and booming automotive consumption contribute to this growth. Automation in diecasting is raising production rates and lowering labor costs.

Alloys of the self-aging, high-strength type which do not require heat treatment are finding wider acceptance because of their unique properties. For extra high-quality, high-strength castings, such as those for aircraft, high-purity alloys, cast by advanced foundry techniques have been successful.

Sand foundries have made outstanding technological progress in casting aluminum. Control of gas content of the molten metal is an important advance contributing to casting quality and strength. Vacuum degassing of melts may become an important method of gas removal. The vacuum solidification test, occasionally followed by density determinations, has become a widely used means of control of gas content.

Mr. Caine . . .

Design for casting is not new. What is new is utilization of stress analysis to prove that the design is good, and use of nondestructive testing to insure quality control in production. Results are startingly successful.

Streamlined design to eliminate stress concentration is a natural for castings. By streamlining and uniform distribution of stress, the part will withstand a higher over-all load with a lower unit load. A softer grade of steel can be used with increased machinability and ease of fabrication. If a still stronger part is needed, the ease and flexibility of the alloying and heat treatment of steel castings fits right into the picture.

Rounded corners, fillets with large radii and gradual, blending of one section into another can be obtained in a casting easier than by any other forming process. End result: A part stronger than those obtained by any other method.

Mr. Seavoy . . .

In the foundry industry, materials handling equipment will continue to be in good demand. Stockyard magnet cranes and auxiliary equipment for mechanized charge make-up will be of modernized designs, with automatic screening of coke and automatic weighing systems.

Inside the foundry there will be wider use of cranes, monorails, motorized trucks, conveyors and electric, pneumatic and hydraulic hoists for lower-cost handling. Some of this equipment will be automatically cycled.

Mold and coremaking will be more and more from automatic machines. Production rates and casting quality will be improved to meet rising standards of machine shop and service requirements.

In metal melting, the trend will continue toward the increased use of preheated air blast and air-moisture control in the interest of greater production and finer metal quality. For the severe demands of our jet age, special metals will be produced under special controlled atmosphere. Heat treatment of castings will be practiced at an increased rate, to bring out the best properties of the metals.

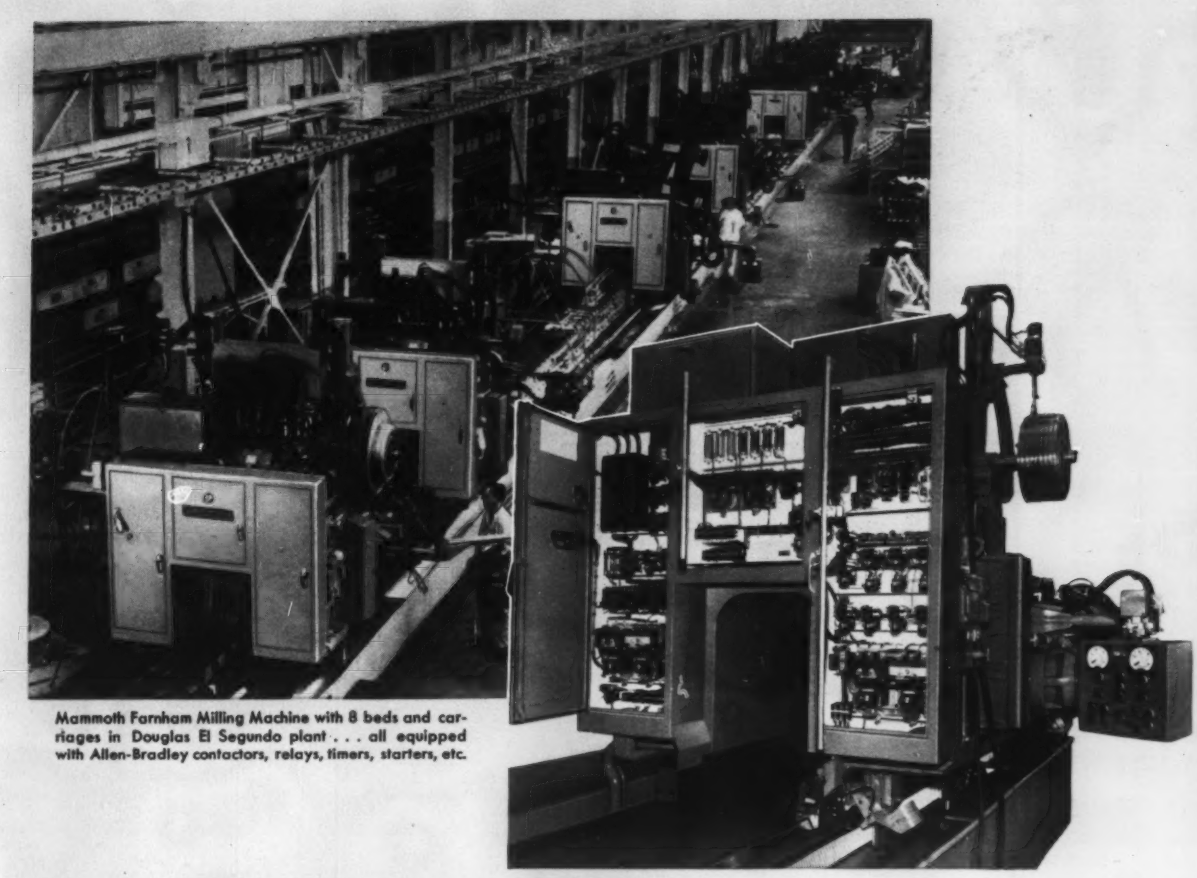
Mr. Bolt . . .

During the last two years, the number of foundries engaged in shell molding is reported to have doubled; during the same period, consumption of shell molding resin increased about threefold.

Shell molding, with its mechanization, will enhance the competitive position of many manual shops. More applications will be discovered. At present, only two of the major automotive manufacturers use shell molding, confining it to a limited number of castings.

Process fundamentals will remain unchanged for the foreseeable future, but the techniques are expected to progress rapidly from the presently used dry sand-resin mix to resin-coated sand which the foundryman can process in his own shop. Dump-box technique will largely be replaced with the blowing of both shell molds and cores.

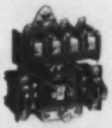
The near future will see increasing



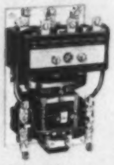
Mammoth Farnham Milling Machine with 8 beds and carriages in Douglas El Segundo plant . . . all equipped with Allen-Bradley contactors, relays, timers, starters, etc.

308 FOOT MILLING MACHINE

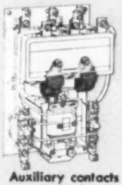
•••operated by Allen-Bradley Motor Controls



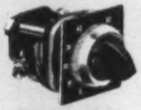
Solenoid starter Size 1



Solenoid starter Size 3

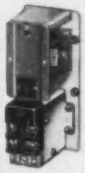


Auxiliary contacts on starter hood



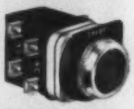
Oiltight potentiometer control

Pendent push button control

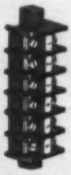


Pneumatic automatic timer

Universal 4-pole relay



Oiltight push button. NO & NC contacts



Interlocking terminal blocks

Oiltight limit switch—all types

When the Farnham Manufacturing Division of The Wiesner-Rapp Co., of Buffalo, N.Y. built this impressive, 308 foot milling machine, they used Allen-Bradley control components for all 8 carriages. Thus, they assured themselves and Douglas of utmost reliability for this complex machine tool.

If you manufacture motor-driven machines, don't overlook the fact that Allen-Bradley motor controls are a big sales asset to any machine. The A-B trademark is a guarantee of trouble free performance . . . and is so recognized by machine tool buyers. Did you notice how much in evidence this trademark was at the Chicago Machine Tool Show?

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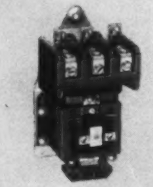
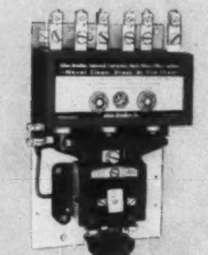
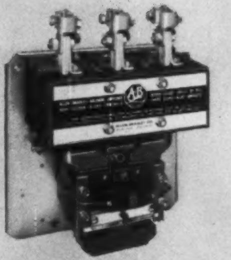
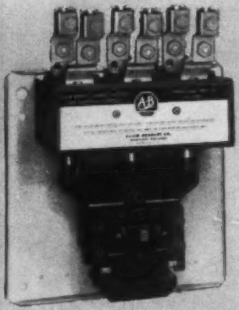
2 pole—Size 00
10 ampere

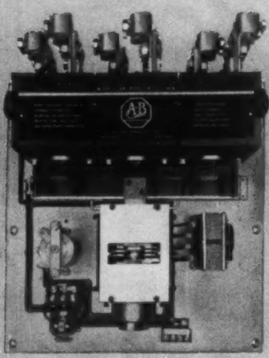

3 pole—Size 1
25 ampere

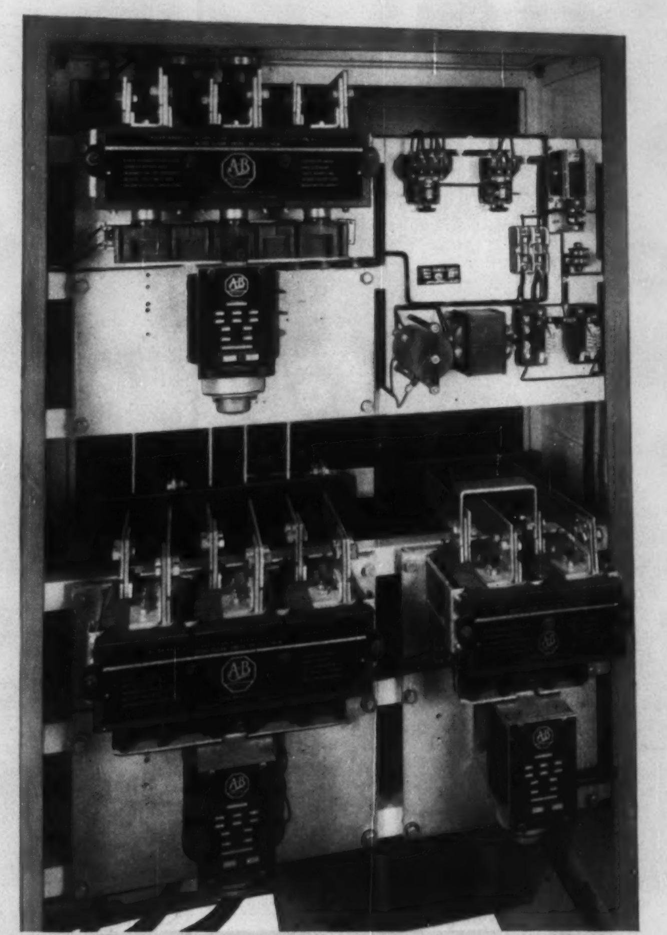
3 pole—Size 2
50 ampere


3 pole—Size 3
100 ampere


3 pole—Size 4
150 ampere


3 pole—Size 5
300 ampere


3 pole—Sizes 6 & 7
600 & 900 ampere contactors


250 Hp, Bulletin 746 automatic autotransformer showing Allen-Bradley Size 7 contactors

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10 to 900 Amperes
with Double Break, Silver Alloy Contacts

The only complete line of solenoid contactors on the market. Allen-Bradley offers nine sizes...from Size 00 (10 amperes) to Size 7 (900 amperes), one to four poles.

There is no contact maintenance . . . no pins, pivots, or bearings to give trouble. Just one moving part—the simple solenoid plunger. Operating characteristics are consistent for all nine sizes.

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SOLENOID CONTACTORS
QUALITY

1-56-MR

use of shell cores in green and dry sand molds, since these cores offer the same advantages of surface quality and dimensional stability inherent in molds. Shell molds as liners for permanent molds will become more numerous. Through use of contoured backs on blown shell molds, stack molding activity will increase.

Mr. Eagan . . .

The most important development in gray iron has been increased demand. A parallel development is increased demand for specification grades of gray iron. The long campaign to educate users that this metal has engineering properties not possessed by any other apparently is paying off. Foundries have been required to revise their processing and melting practice to meet the demand. This trend most certainly will continue.

Interest in nodular iron continues to mount, resulting in a substantial increase in production of the metal. Greatest use appears to be in the agricultural, heavy machinery, internal combustion engine and metalworking fields. Of particular interest is increased use in making gears. Results, compared with steel gears, are excellent.

Mr. Reid . . .

Copper and brass alloy castings are finding greater consumer acceptance owing to the better alloying control afforded newer melting techniques. They include vacuum melting and electric furnaces which employ the newer types of refractory materials. The processes do not contaminate the metal or cause pick-up of foreign substances which might be detrimental to the physical and electrical properties of the brass or bronze alloys.

Brass and bronze foundries have become more aware of the importance of dimensional accuracy in castings. To get better results they are using such methods as shell molding, the CO_2 process and the D process. Mechanization is being added to conventional green sand molding.

Mr. Rote . . .

Increasingly larger tonnages of pearlitic malleable are being used for universal yokes, transmission carriers and covers, automotive differential gear cases and large and small crankshafts. Present demands for malleable iron appear stable.

There is a continuing trend in both pearlitic and ferritic malleable toward improved surface quality during annealing. High nitrogen atmospheres and modified carbonaceous atmospheres provide a high degree of uniformity. There is a continuing development toward structural control with additive materials, such as boron, bismuth and tellurium.

In pearlitic malleable development, widespread utilization of oil or other liquid quenching media appears inevitable. This practice provides a high degree of uniformity. A controlled wide range of properties can be secured.

Mr. Olson . . .

As sand foundrymen, we had been steadily losing business to other forms of fabrication. Today, as more and more parts are being shell molded, we see a reversal of this trend.

Use of shell cores undoubtedly will become more widespread. Shell or hollow cores, made from silica sand which is coated with a small amount of phenolic resin, make it possible to produce castings with interiors smoother and more accurate than possible before. The remarkable collapsibility and gas elimination characteristics of shell cores make them ideal for shell molding, green sand molding or permanent molding—and they can be made at less cost and with less tooling and equipment. Cores (from small ones, up to the larger automotive and machinery types) are being produced at high rates and low cost.

Foundrymen who have tried the shell process, sometimes under pressure exerted by engineers and manufacturing executives, have found it to be profitable and productive of better customer relationships.

Mr. Barlow . . .

High-pressure equipment centers chiefly on the diaphragm molding process. A rubber diaphragm becomes a flexible contour "squeeze board" which permits the application of full line pressure toward all parts of the pattern. It produces unusually hard, dense molds with any type molding sand. Castings of close dimensional control are obtainable.

Recent development work points to

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Chief Research Metallurgist
Cooper-Bessemer Corp.
Grove City, Pa.

VAUGHAN C. REID
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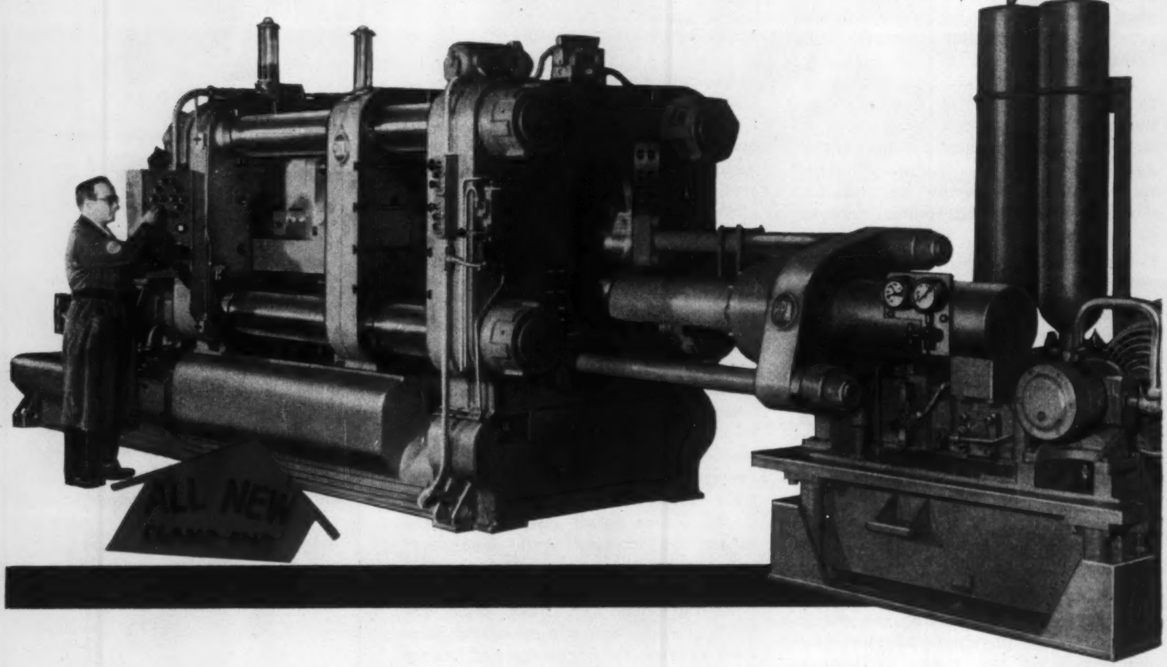

Do These FEATURES Solve Your Problems?

We Believe They Do!

- Positive, self-compensating lock to the rated tonnage or better . . . high mechanical advantage from flat-faced wedges and knuckle joint links.
- Less die flash . . . plenty of "beef" in rods, platens, locking mechanism . . . large bearing areas—low bearing load.
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- Maximum speed and pressure cycles through ample horsepower.
- Electric-hydraulic safety interlock . . . control of stroke, slowdowns . . . automatic cycling including three core pull sequence . . . complete flexibility of operation.

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- A completely self-contained unit . . . not dependent on clamp end for operation.
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- Complete control, through special valves, for any distance—speed curve.
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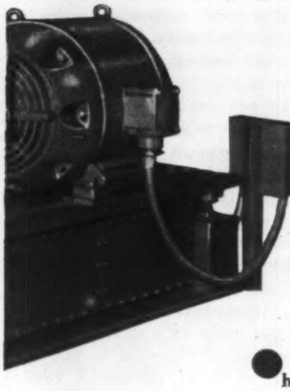
- Flexible injection stroke for control of metal volume and cover die thickness.



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HPM

DIE CASTING DIVISION
THE HYDRAULIC PRESS MFG. CO.
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VINCENT S. LAZZARA
President, Casting Engineers Inc.
Chicago
President, Investment Casting Inst.

JAMES H. LANSING
Technical and Research Director
Malleable Founders' Soc., Cleveland

successful use of the diaphragm high-pressure squeeze with sodium silicate sands. These molds are made in shallow flasks to impart a contour or shell effect. They are cured in 5 to 15 seconds with carbon dioxide. The two mold halves are available immediately for clamping and pouring.

This is thought to meet the need for high-speed production of cured molds when green-sand, high-pressure molding does not have sufficient strength or resistance to erosion to permit intricate patterns to be used. For work which can be successfully molded and cured in green sand, economy would rule out the cured mold process.

Mr. Lazzara . . .

Castings made with the investment casting process are finding new markets at such a rate that the Investment Casting Institute looks to a 30 per cent sales increase in 1956. Orders in recent months are 40 to 50 per cent over those in the same period last year.

A conservative estimate is that 1955 sales hit about $185 million, an increase of about 27 per cent over 1954's. The 1956 estimated sales of $175 million compare with $75 million in 1948 and a slim $25 million ten years ago.

Seventy per cent of the 100 firms making up the industry have started making investment castings since 1945. Increased emphasis on improved quality control and recognition by producers of the limitations of the investment process have had a lot to do with the consistent growth.

While increasing applications for aircraft components remain the backbone of the industry's strength, there is a phenomenal increase in new applications, such as electronic equipment, machine tools, business machines, food equipment, farm machinery, turbines, compressors, oil field tools and even consumer items like sewing machines and cameras.

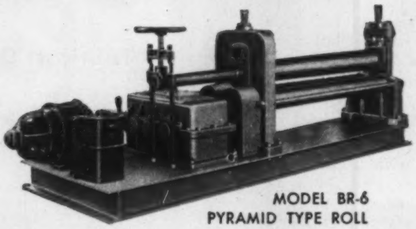
Mr. Lansing . . .

Co-operative work on the gating and feeding of malleable iron castings, a research project of the Malleable Founders' Society, has paid dividends. Through increased efficiency of gate and feeder design, yields have been increased, soundness maintained and remelt reduced. Work is being done on high temperature and other basic properties. More mal-

WEBB PLATE FABRICATING MACHINERY

PLATE BENDING ROLLS

The Webb Corporation offers a complete line of Plate Bending Rolls for the rolling of the thinnest plate up to plate 2½" thick. Offered in a variety of lengths and thicknesses. Constructed for the modern fabricating shop.



MODEL BR-6
PYRAMID TYPE ROLL

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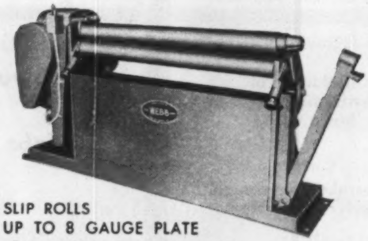
INITIAL PINCH TYPE ROLL

Two types available: the Initial Pinch Type and Pyramid Type machines. All latest advantages of today's modern machine tools are incorporated, utilizing anti-friction bearings, totally enclosed gear drives. Special forming rolls for culvert pipe, stock tanks and other special shapes available.

SLIP ROLLS

A complete line of small Sheet Metal Forming Rolls are also available. All power-driven with shaft sizes 3" to 5" for the handling of the thinnest gauge material, up to 8 gauge material. Special rolls for the forming of polished sheets, aluminum and stainless steels can be furnished. Complete catalogues on any size machine furnished upon request; write Dept. D.



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UP TO 8 GAUGE PLATE

Let Speed PAY–The WEBB Way!

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Also Manufacturers of INDUSTRIAL WEIGHING EQUIPMENT

Since 1881 THE WEBB CORP.
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leable foundries are working with users on effective design, some making excellent use of stress analysis.

Recognizing the enhanced properties of pearlitic malleable, the American Society for Testing Materials has issued a revised specification, A 220-55T. Its range: From a high-elongation grade with minimum values of 10 per cent elongation, 45,000 psi yield and 65,000 psi ultimate tensile strength to a high-strength grade with minimum values of 100,000 psi ultimate tensile strength, 80,000 psi yield strength and 2 per cent minimum elongation. Intermediate grades will cover all requirements.

Mr. Davidson . . .

Activity in the foundry industry parallels the upswing experienced by most manufacturers of metal products. In many areas, foundry facilities have been extended and capacities increased. Research and development programs by foundries and foundry equipment manufacturers have contributed much to satisfy the demand for more good castings at lower cost.

The trend in foundries and foundry equipment is toward more efficient layouts of machines, greater degree of mechanization, greater ease of maintenance and better equipment to stand up under severe operating conditions (sand, heat, gases and physical abuse).

Progress has been made, and more is to follow, in coremaking and core setting, sand control, molding, mold closing, melting and pouring, shakeout and knockout and finishing. New molding methods have been developed for highly finished, complicated castings. Improvements are looked for in improved working conditions, better ventilation, reduction of noise level and reduction in human effort.

Mr. Walton . . .

A new product is rapidly developing: The engineered gray iron casting.

Typical of developments which have enabled foundrymen to improve the casting process are nodular cast iron, shell molding, basic-lined cupola melting and automatic molding. Some of the new methods are suitable only for large quantities and high rates of production. Others can be of great value in jobbing work.

For example, electronic equipment has been perfected to control automatically the moisture content of molding sand. This approach to a

D. E. DAVIDSON
V.P. Sales, Link-Belt Co., Chicago
President, Foundry Equipment Mfrs. Assn.

CHARLES F. WALTON
Technical Director
Gray Iron Founders' Society
Cleveland

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TO ✓ Cut down-time
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FERROUS AND NON-FERROUS CENTRIFUGALLY CAST ROLLS, SLEEVES, TUBES, LINERS, CHUTES, RETORTS, RINGS, BUSHINGS, BEARINGS, ETC.

Here you'll find a skilled staff in completely equipped laboratories testing new materials, developing new processes, helping to make better castings for your specific requirements.

These improvements are directly translated into uniform, strong, close-grained ferrous and non-ferrous castings with extreme resistance to corrosion, heat, and abrasion. As another service, the Chief offers machining facilities for turning, boring, and drilling.

Bring your casting problems to the Chief's thoroughly trained specialists. These men are always available to apply their broad experience to your particular needs.

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CENTRIFUGAL CASTINGS
FERROUS AND NON-FERROUS
SANDUSKY FOUNDRY AND MACHINE CO., Sandusky, Ohio

F. X. BUJOLD
Manager of Foundries, Ford Motor Co., Dearborn, Mich.

J. C. FOX
Die-Casting Consultant
Toledo, O.

perennial foundry problem may be used in the well-equipped foundry making either high production or jobbing work.

This rapid technological development is causing a change in the nature of the foundry business. Foundries of the "new" castings industry are offering skilled technical assistance to customers. Manufacture of engineered castings can be classed as a service industry rather than one which sells bulk commodities or warehoused materials.

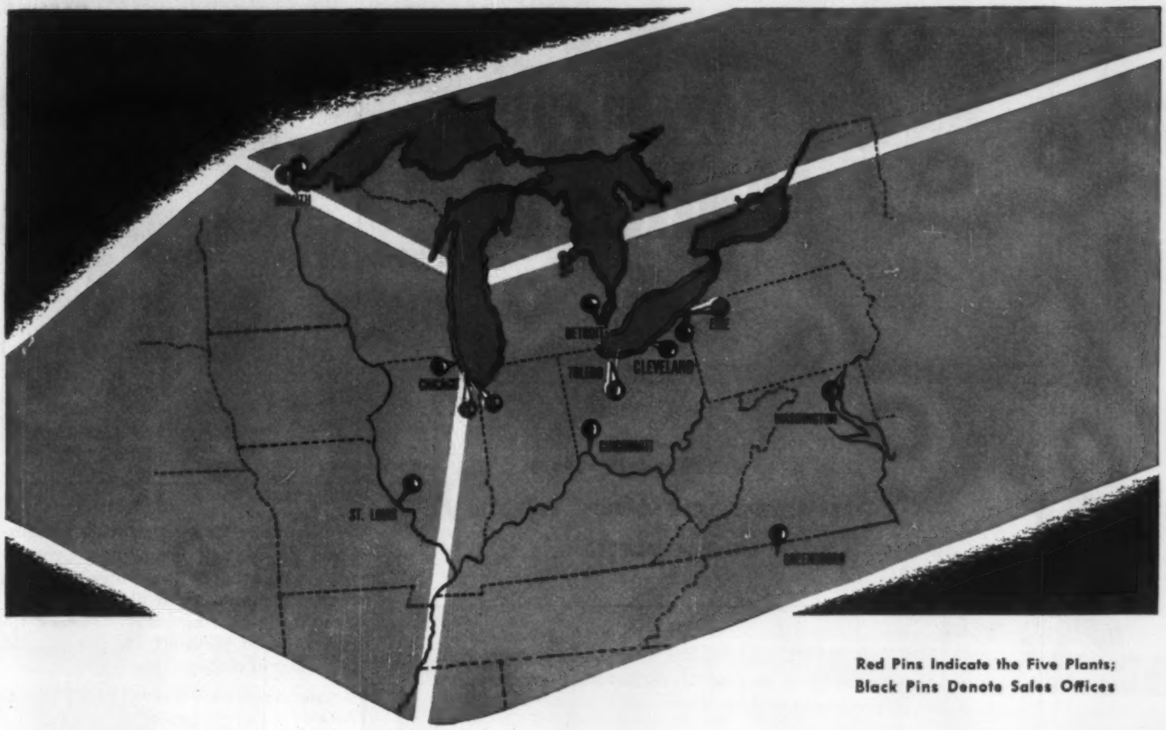
Mr. Bujold . . .

The castings industry is witnessing important changes. New metals, processes and equipment are coming to the fore to meet the ever increasing demand for closer dimensional tolerances and improved machinability.

New metals are replacing other more costly materials, and a continuance of this trend is assured. New processes and equipment show much promise for melting, molding and coremaking.

Mr. Fox . . .

Indications are that consumption of zinc-base diecastings was higher in 1955 than in 1954 by more than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... Don't overlook the advantages of this highly versatile material!

STANDARD malleable iron is a strong cast ferrous alloy having a remarkable combination of properties:

- ✓ Toughness and ductility
- ✓ High impact resistance
- ✓ Excellent machinability
- ✓ Resists corrosion

...and how about Pearlitic Malleable?

PEARLITIC malleable iron is a special type of malleable having these unique characteristics:

- ✓ Exceptional bearing properties
- ✓ High yield strength—45,000 to 80,000 psi.
- ✓ Easily machined
- ✓ Can be selectively hardened

It's easy to design for simplicity and good appearance in malleable iron —helps you cut costs on current production. Consult your nearest malleable foundry or write to the Malleable Founders' Society for further information.

Malleable FOUNDERS' SOCIETY

1800 Union Commerce Building Cleveland 14, Ohio

L. G. VANDERHOOF
Vice President & General Manager
Stewart Die Casting Div.
Stewart-Warner Corp., Chicago

38 per cent. The figure for aluminum-base, die-casting usage was over 50 per cent greater than any previous high. Consumption of diecastings will keep on increasing yearly. (There appears to be no limit on the size or intricacy of a diecasting.)

The American Die Casting Institute's research group is conducting a critical study of methods and materials. Its aim: Maximum quality castings at lower cost. Development of better die materials, higher strength alloys, more efficient casting methods and better finishes are objectives.

The Institute is aiming for greater standardization of the diecasting process. Recently, it issued process standards covering design and engineering data on such matters as tolerance, dimensions and other features to promote maximum economy in casting applications. In preparation are standards on the metallurgical phases.

Mr. Vanderhoof

Probable diecasting increases over previous highs (38½-per cent for zinc and 59 per cent for aluminum) make 1955 a record year. Factors in the increased usage of zinc are: High home appliance volume and the large automotive grilles, front end elements, trim and hardware. Aluminum consumption, more than double that of 1954, resulted from stepped-up applications and volume in all fields, particularly office equipment, business machines, photographic devices, appliances and automotive transmission components.

Using 1955 as a base, a 35 per cent increase in zinc and 113 per cent increase in aluminum tonnages seem reasonably assured for 1960. These

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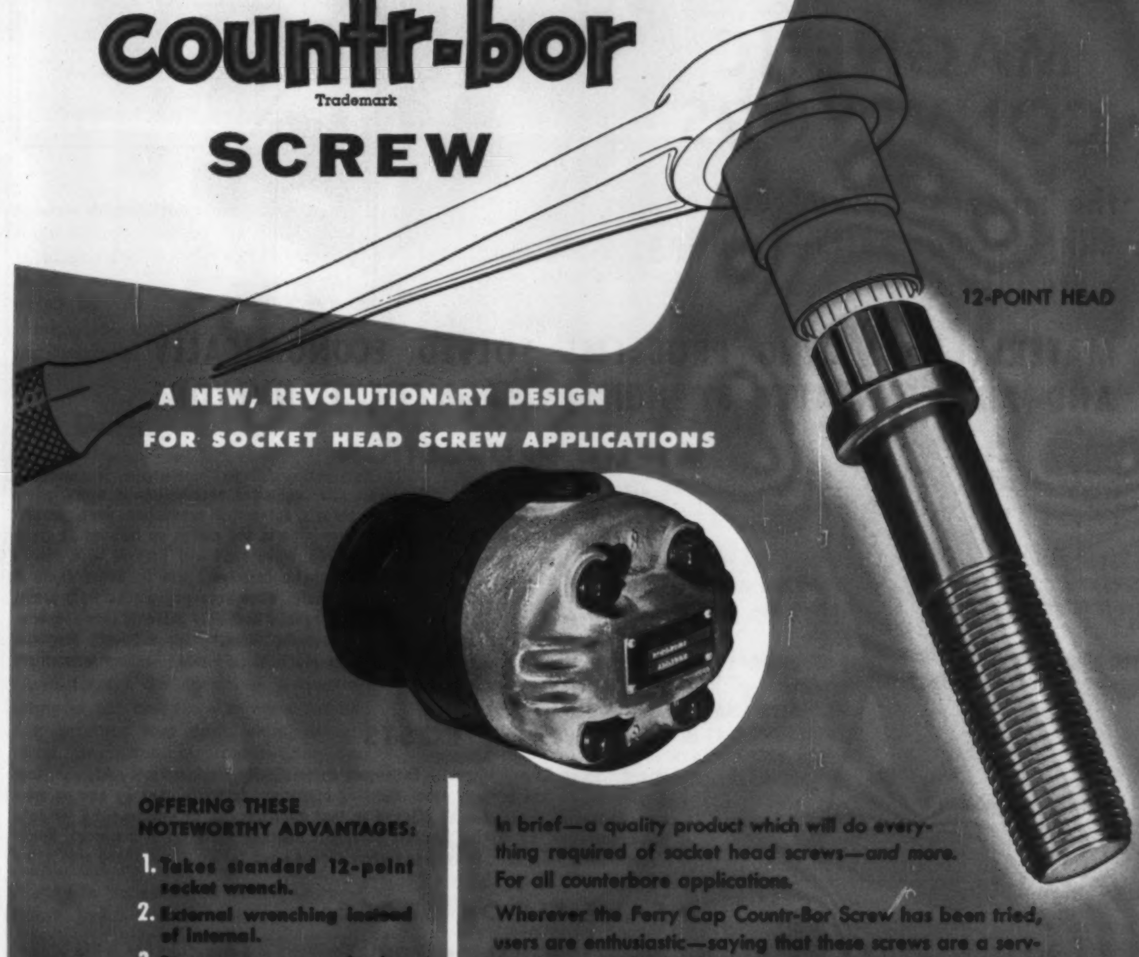
SCREW



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1. Takes standard 12-point socket wrench.
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3. Stronger—more gripping surface.
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In brief—a quality product which will do everything required of socket head screws—*and more.* For all counterbore applications.

Wherever the Ferry Cap Countr-Bor Screw has been tried, users are enthusiastic—saying that these screws are a service man's dream and the best development in socket screws in recent years. They will help you lick tough assembly problems where socket screws are required.

We shall be glad to send samples, prices and complete information promptly upon request.

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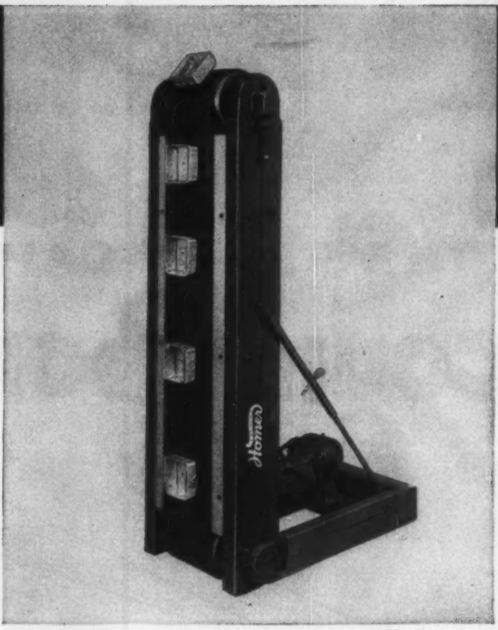
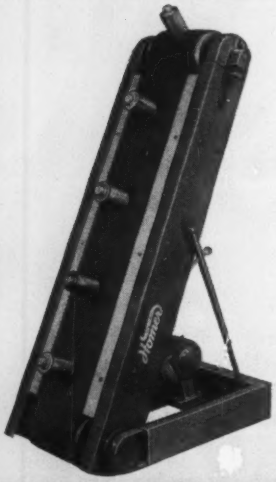


"Space Saver" MAGNETIC CONVEYORS

the modern method of handling ferrous parts—reducing material handling costs

MATERIAL HANDLING PROBLEMS SOLVED ECONOMICALLY AND AUTOMATICALLY BY HOMER MAGNETIC CONVEYORS



• SPEED PRODUCTION

Homer "Space Saver" Magnetic Conveyors offer unlimited possibilities in every industry for automatic material handling in today's automated production lines. In one operation, they both convey and elevate ferrous parts and pieces up inclines as steep as 90°—picking up from floor level if required. When used with presses with gravity discharge chutes, Homer "Space Saver" Magnetic Conveyors will fit under chute if there is as little as 6" clearance, floor to chute. When receiving pieces from press, pieces are securely held and conveyed—the magnetic assembly prevents loss of pieces from belt caused by belt resilience and bouncing. Homer "Space Saver" Magnetic Conveyors make close grouping of machines practical . . . make tandem or multiple machine operation possible.

• CUT LABOR COSTS

Homer "Space Saver" Magnetic Conveyors automatically stack ferrous parts . . . feed machines . . . and perform other handling operations formerly done by one or more men. Conveying speed may be planned so that machines can be synchronized for automatic operation. By making possible automatic multiple operation of machines, Homer "Space Saver" Magnetic Conveyors further reduce labor costs . . . and speed production.

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Including Homer "Space Saver" Magnetic Conveyors in a production line is like building an addition to your plant . . . they actually add valuable productive floor space. By conveying ferrous materials up inclines as steep as 90°, they eliminate long conventional conveyors with gradual inclines . . . so that production machinery can be placed much closer together.

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W. J. DURING
President, Precision Castings Co.
Inc., Syracuse, N. Y.
President, American Die Casting Inst.

figures do not include additional tonnage that might be derived through technological developments and research programs such as those sponsored by the Die Casting Research Foundation and American Die Casting Institute.

Mr. During . . .

Greater stability of raw metal prices is anticipated this year, particularly aluminum, as new production facilities come in. This should enable the die-casting industry to expand even wider.

Another factor contributing to industry growth is the gradual improvement of die steel and lubricants. Customers have shown a noticeable demand for complete service, including product and component design, machining, finishing, assembling and even packaging and shipping.

Notable is the growth of the captive die-casting operation. This may be part of another cycle of experimentation by the metalworking industry in its research to lower costs. Some years back many companies dissolved their own die-casting operations and reverted to purchase of castings from custom shops when they found captive operations too costly. Meanwhile, both captive and job shops are turning out record production.

Mr. Rassenfoss . . .

Methods of making molds for steel castings are undergoing a revolution. Several are capable of producing castings of better surface quality and closer dimensional tolerances than can be attained now. Some foundries are producing castings by shell mold-

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Investment Casting permits new approaches to design and production engineering, unbound by the restrictions of traditional metallurgical practices and manufacturing techniques.

Major economies are obtained when your products or components are designed . . . or redesigned . . . with tolerance, surface and inspection criteria to conform with casting techniques. The resultant savings in final cost and production time, more than repay this small investment.

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CASE IN POINT!

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The rudder over-balance eliminator used on the jet bomber is an investment casting of specification QQ-M-55 Magnesium, Alloy AZ-92. This intricate design is more economically produced by investment casting than any other process, permitting design freedom and assuring quality performance.

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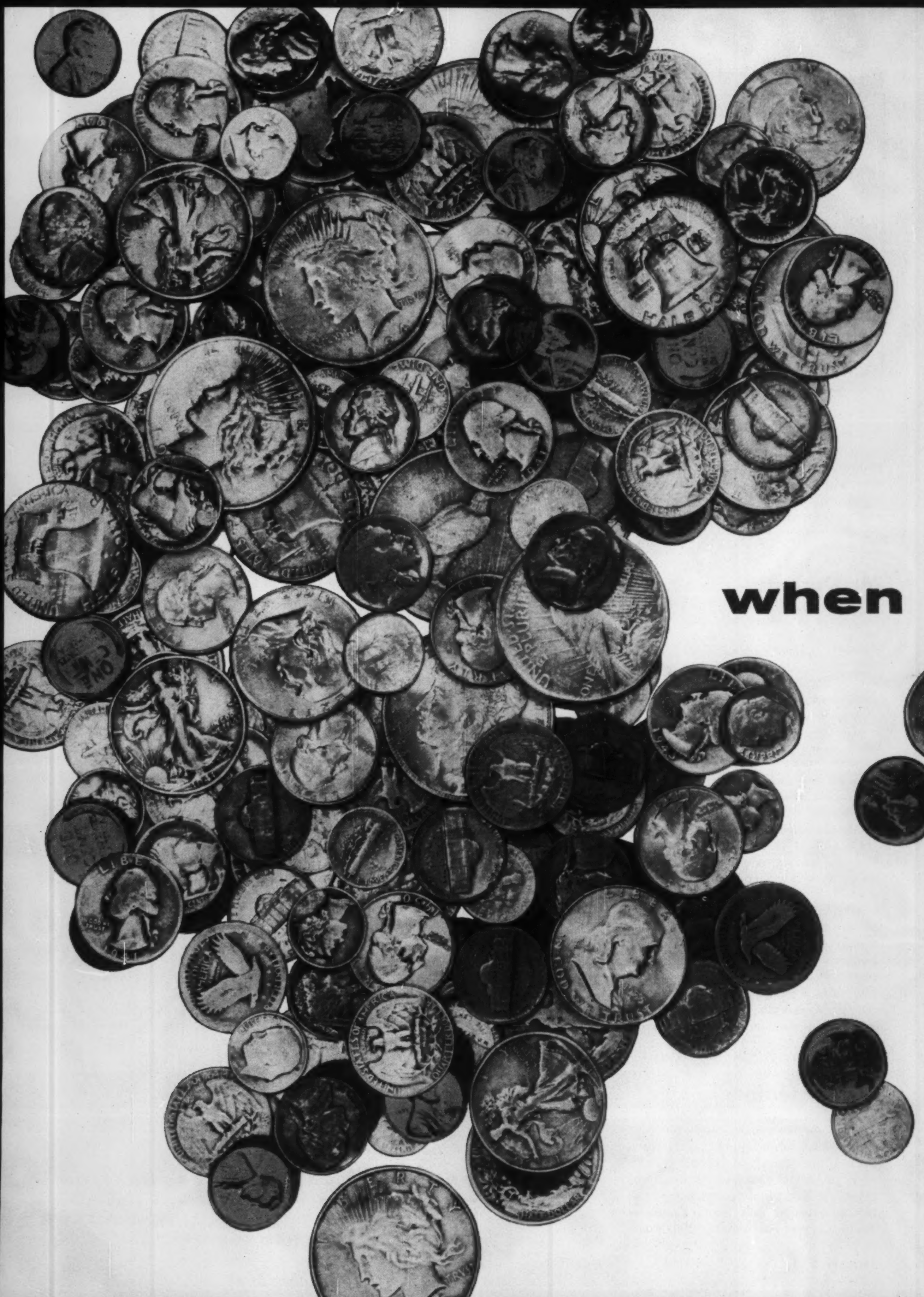

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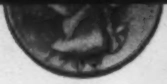

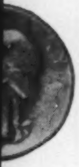

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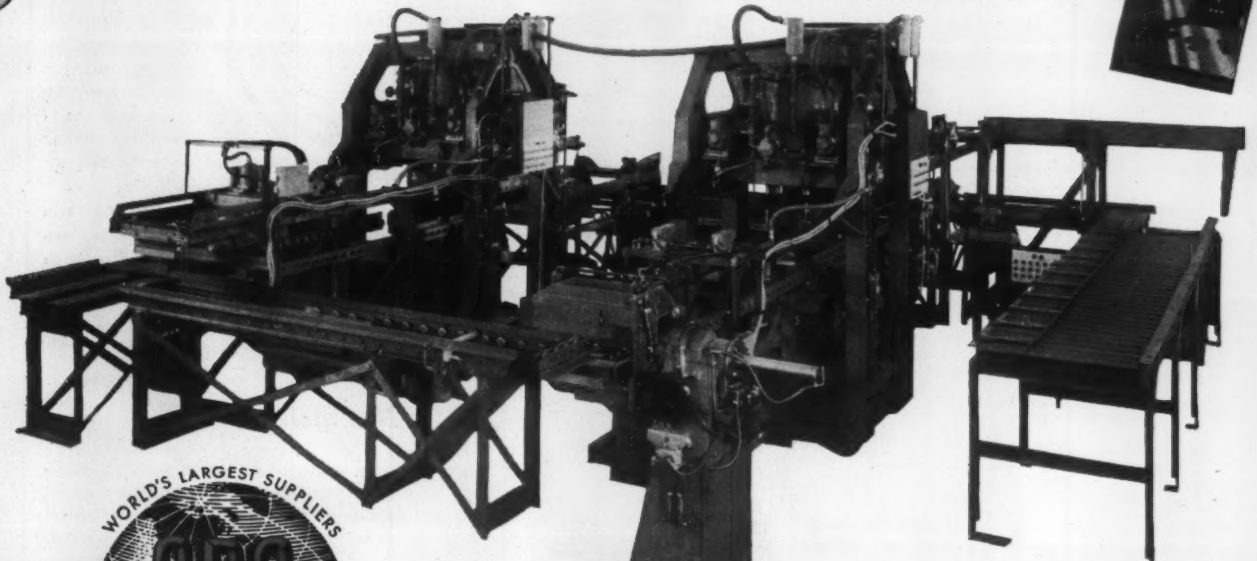

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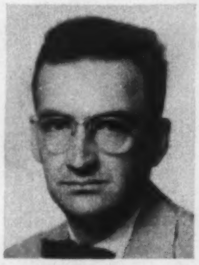


JOHN A. RASSENFOSS
Manager, Mfg. Research Laboratory
American Steel Foundries
East Chicago, Ind.

WALTER E. SICHA
Chief, Aluminum Research
Laboratories, Aluminum Co.
of America, Cleveland

ing. Last year, one steel foundry started ceramic molding as a licensee of the Shaw process.

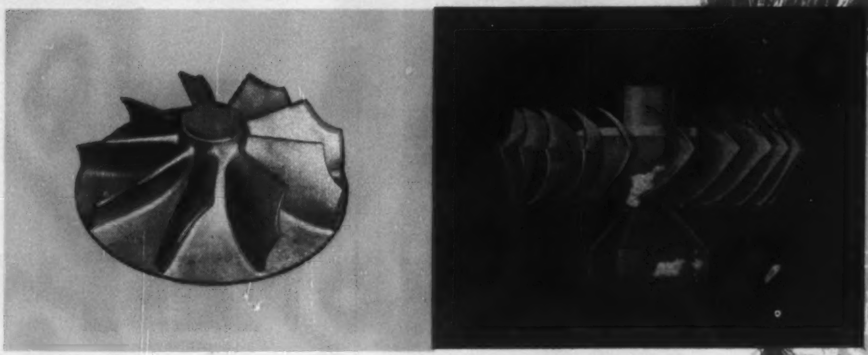
To reduce the effort and cost of preparing castings for shipment, the carbon-arc method of metal removal has been introduced in numerous steel foundries and is becoming the major tool in cleaning operations, replacing both chipping and grinding in many cases. Recent developments in ultrasonic testing will lead to speedier and more economical internal inspection.

New welding techniques for the fabrication of wrought materials are being used in the steel foundry, both for casting repair and the fabrication of structures using castings or a combination of castings and wrought materials.

Mr. Sicha . . .

Production of aluminum castings by diecasting now exceeds permanent mold production. More extensive use of aluminum-alloy castings by the automotive industry is clearly in prospect.

Recent development of alloys and foundry techniques for castings with higher mechanical properties should expand the use of aluminum castings



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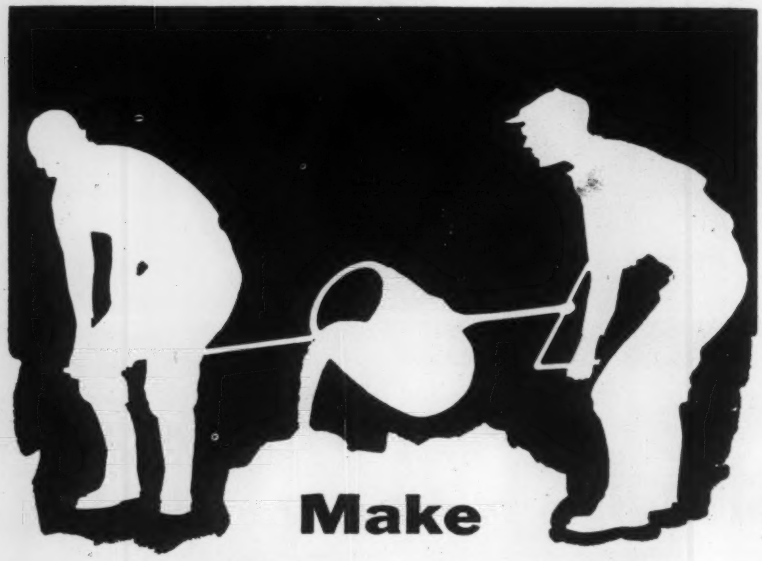

Make high-strength aluminum castings without heat treatment!

Foundries without heat treating facilities are producing high-strength aluminum castings with Federated's Tenzaloy. Mechanical properties are equivalent or superior to the common heat-treated alloys, and impact strength is greater.

Tenzaloy, a product of Federated research, is a self-aging alloy of the aluminum-zinc-magnesium type. It reaches full strength after a few days aging at room temperature. No special casting precautions or facilities are required.

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L. J. WISE
Vice President, Chicago Malleable Castings Co., Chicago

in aircraft frame construction. The volume of the aluminum bearing business has increased steadily, and this trend is expected to continue. Colored vitreous enamel coatings for cast aluminum cooking utensils have been introduced, and other applications for these coatings probably will be developed.

Vacuum treatment of aluminum melts or vacuum melting has been proposed for improvement of melt quality. A relatively new process for the production of sand cores used in making aluminum castings entails mixing sodium silicate with the core sand and curing the core by introducing carbon dioxide into the sand while the core is in the core box.

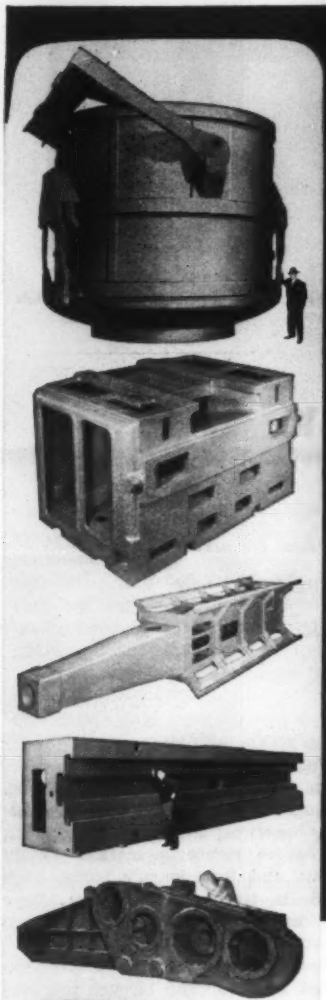
Mr. Wise . . .

The malleable castings industry will continue to expand its usefulness as a supplier of components. First, there is increasing adoption of pearlitic malleable for components previously made of forgings, weldments or other cast materials. Secondly, producers of malleable castings have continued to improve their manufacturing processes through mechanization, modernization and research. They have quality control programs and use modern inspection procedures.

Many producers have recognized the advantage of offering assistance in casting design. This creates a closer relationship between engineering personnel of foundries and their customers.

Lastly, the seeds planted by the Foundry Educational Foundation are beginning to bear fruit. Engineering graduates are aware, as never before, of the advantages of castings as an engineering material.

Steel-Weld
FABRICATION



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General Manager, Vacuum Metals Corp., Syracuse, N. Y.

MATERIALS AND METALLURGY

FORUM ON TECHNICAL PROGRESS

Metals will be used nearer the limit of their abilities to save weight and money . . . vacuum metal capacity will double this year . . . leaded carbon steel plates enter the picture . . . manganese-nickel stainless becomes standard . . . light metals mushroom in automotive use . . .

Mr. Mann . . .

Improvements in present high-temperature alloys will have to be made in production by closer control of arc melting and further evaluation of vacuum melting.

New and better alloys must be developed for engines in the drawing-board stage by co-operation between aircraft engine manufacturers and the specialty steel industry. Also, the need for higher strength in aircraft frames will require new, more highly alloyed, specialty steels to meet the physical requirements of high-speed planes.

This co-ordination of research and development between the aircraft and the specialty steel industries must be a continuous operation to keep ahead of the demands for jet aircraft use.

Mr. Rodgers . . .

Many steel shapes are being replaced with aluminum where lightness, attractive appearance, corrosion resistance and over-all low cost are required. There is a swing to aluminum tubing. In the near future, it may possibly have many applications in the automotive field, particularly in shapes.

Aluminum can be colored readily and adapts itself nicely to automobile trim and other decorative uses. A new welding machine is needed to weld aluminum shape or strip to the body work.

The use of finned tube is gaining ground in the petrochemical and processing industries. The fins are spirally extruded from thick-wall tube. There are no sharp angles or crevices, and the diameter of the plain end is slightly larger than the diameter over the fins. This allows the tube to be inserted into a tube bundle and rolled into a tube sheet similar to that of a plain tube.

Heat exchanger costs are reduced. Fewer tubes mean fewer holes to drill, fewer rolling-in operations and the use of smaller shells, heads and baffles. Fewer tubes mean less cleaning time, with resultant less off-stream line.

Mr. Langhammer . . .

Last year was the first in which the tonnage of American-produced iron powder exceeded imported tonnage; the ratio was 2 to 1. Estimated total tonnage, domestic and imported, for 1955 was nearly twice that consumed in 1954. Domestic sources are expanding facilities, but 10,000 tons are still imported annually.

Research is broadening. Emphasis is on high-temperature applications, coatings, cermets, iron and steel alloys, beneficial additives, substitutes for scarce strategic metals, highly porous and low density parts, high physicals, titanium, aluminum alloys and integration of sintering and growth phenomena.

New production records are expected in 1956. The largest increase is predicted in finished machine parts of iron powder. Bearings of iron powder or iron powder base, and bearings and finished machine parts of nonferrous metals and alloys also will be in greater demand. Machine parts of larger size and higher physicals appear certain.

Mr. Moore . . .

Increase in capacity was the most important feature of the vacuum melting picture last year. This should give assurance to users that producers can supply vacuum melted products in practical quantities.

This expansion not only increases capacity for products such as bearing steel bars, but makes it possible to get forging billets of sufficient section to investigate the use of the materials in critical structural components of aircraft.

The most important product development of the year was the extension of vacuum melted bearing steels

M. J. DONACHIE
President, Beryllium Corp.
Reading, Pa.

M. J. DAY
Vice President-Research & Development, Crucible Steel Co. of America
Pittsburgh

C. B. POST
Vice President-Metallurgy
Carpenter Steel Co.
Reading, Pa.

F. L. LAQUE
Vice President, International
Nickel Co. Inc., New York

to highly stressed bearings, the previous application having been in instrument bearings. Considerable effort is being devoted to getting current bearing steels into volume production and developing improved grades. Other volume potentials for 1956 lie in steels for heavily loaded aircraft valve springs and in tool or stainless steels for rolls and dies.

High boron stainless steels are being vacuum melted to get sufficient workability to permit their use as atomic control or shielding materials. Other materials for nuclear power plant applications are being investigated as potential commercial products.

Mr. Donachie . . .

Beryllium copper has become a strong competitor as a die material in hot and cold forming. It is particularly suitable for dies that can be made quickly and produce economically over a wide range of temperatures. The material also is being used in dies for short-run steel forgings and forming titanium parts.

Nickel-base beryllium alloys enjoy limited usage in a few special-purpose applications because of their high strength, excellent castability and resistance to moderately high temperatures. Wrought beryllium-nickel alloys, now being developed, feature superior corrosion resistance and high strength, coupled with excellent ductility and ease of hardening.

Metallic beryllium has high potential value in the atomic energy field. Other promising developments are beryllium - copper alloys of lower beryllium content than those now standard. These materials vary from a trace up to, but not over, 0.5 per cent beryllium. Current carrying applications, which are not using beryllium copper, are the intended outlets for this new group of alloys.

Mr. Day . . .

Technological demands for alloys of ultrahigh quality to meet present and future engineering requirements present an outstanding opportunity for research and development. Current production melting techniques cannot supply the highest quality standard alloy steels desired, nor meet the exacting requirements for many new and specialized alloys.

Aircraft operating at ever-increasing speeds and temperatures require low-alloy steels of unusual quality, and high-alloy steels and superalloys with analyses difficult or impossible to produce with the most modern air-melting techniques. Nuclear reactors require metals and alloys of extreme purity and unusual physical and chemical characteristics.

Vacuum melting may offer a solution. It gives higher purity materials with improved ductility and increased fatigue resistance. Tensile and stress-rupture properties are increased. Through the elimination of gases, such as oxygen and nitrogen, it is possible to make steels with alloy additions which normally react readily in air—titanium, aluminum, zirconium and vanadium.

Mr. Post . . .

Stainless steels are finding wider use, with a demand for upgrading in quality. Especially is this true in the aircraft engine field. Turbine stainless steels that meet the quality requirements demanded of alloy steels used in aircraft are available.

The growing volume of servomechanisms and electronic parts will make itself felt in the field of magnetic alloys. An increasing quantity of high-nickel steels of the permalloy types will be required to meet the critical needs of such applications.

More activity in heavy press and forging work has created an unprecedented demand for large extrusion dies and tools. Steel users are looking more for pretreated and rough-machined blocks, rings and heavy tools.

Greater emphasis will be placed on using equipment for scale-free, decarb-free or "bright" hardening. Tools so hardened can be made closer to finish size. At the same time, they require less finish grinding and preparation prior to use.

Mr. La Que . . .

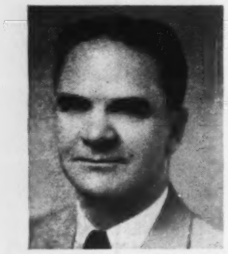
Technical developments and application trends in materials and metallurgy will take these paths:

1. Alloys that can withstand high stresses at high temperatures, as in heat engines and high-speed aircraft, and materials that are subject to high stresses at subzero temperatures.

2. High-strength materials that can be used nearer the limits of their abilities to save weight and money.

3. Construction materials with special corrosion resistance properties which will stand up under atmospheres encountered in the chemical, petroleum and process industries.

4. Improved welding and other joining processes, precision casting and powder metallurgy to reduce



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M. N. ORNITZ
Works Manager. National Alloy Div.
Blaw-Knox Co., Pittsburgh

C. L. HARDY
President. Joseph T. Ryerson & Son
Inc., Chicago

W. G. OVERACKER
Sales Manager, Naresco Equipment
Corp., Newton Highlands, Mass.

fabrication and maintenance costs.

5. Innovations in claddings and coatings deposited electrically, or by chemical reduction on inexpensive bases to reduce the initial cost of corrosion resistant equipment.

Mr. Chesnut . . .

Interesting installations of induction melting equipment last year were new and larger vacuum melting furnaces and larger ferrous and nonferrous melting furnaces. Several 1000-lb vacuum furnaces have gone into production at Universal-Cyclops Steel Corp., Carboloy Department of General Electric Co. and elsewhere. Many smaller vacuum furnaces have been built.

The output, largely for defense projects, also includes a considerable volume for experimental and test uses to determine the value of vacuum melted metals for a growing field of more routine industrial applications.

Sandusky Foundry again made history. First, it doubled its installation of large ferrous and nonferrous melting furnaces. Second, by simultaneous operation of four, 5-ton furnaces, it obtained 40,000 lb of metal in a single pour. The end product was a hollow, centrifugally cast, stainless steel cylinder (42 in. in diameter by 21 ft long). It is believed to be the largest ever cast by this method.

Mr. Ornitz . . .

Considerable progress has been made in high temperature alloys. In a three-year period, the operating temperatures of gas turbine buckets has gone from 1100 to 1500°F.

Improvements in properties of alloys have been made by recent developments in manufacturing techniques such as vacuum melting. Current modifications of the superalloys and the development and application of cermets have increased operating temperatures for turbine buckets. Of particular interest is the protection of high melting metals, such as molybdenum and tungsten, from catastrophic oxidation, and the development of alloys of these elements to take advantage of their superior high temperature strength.

In the steam power field, considerable attention is being given to raising operating temperatures to 1200°F with pressures as high as 5000 psi. In the industrial furnace field, Fe-Ni-Cr alloys are being improved with marked increase in strength for the 1600-1800°F range. An outstanding development in this field is the development of NA-22H which has made possible practical engineering design through its use for temperatures up to 2200°F.

Mr. Hardy . . .

The construction industry soon will become a leading user of stainless steel because of developments in noncombustible wall construction. They combine light weight, good insulating properties, moderate initial cost, long life and low maintenance with a clean, modern appearance. Both prefabricated and field assembled curtain-walls with exterior steel facings are being used for multistory buildings.

Among more recent developments is the insulated sandwich wall, with "Mansard Pattern," formed stainless sheets for the exterior surface. "Mansard Pattern," field-assembled sandwich walls are being specified by industrial firms that require both mill-type and high bay, crane-served buildings. The erected cost for a stainless steel insulated sandwich wall is less than that of an 8-in. masonry wall, and the insulation value of the sandwich wall is better.

The Inland Steel Co. building, now under construction in Chicago's Loop, uses stainless-faced, precast concrete panels which are 5 in. thick, 5 ft wide and 13 ft long. Stainless-faced precast concrete spandrels are used on window areas.

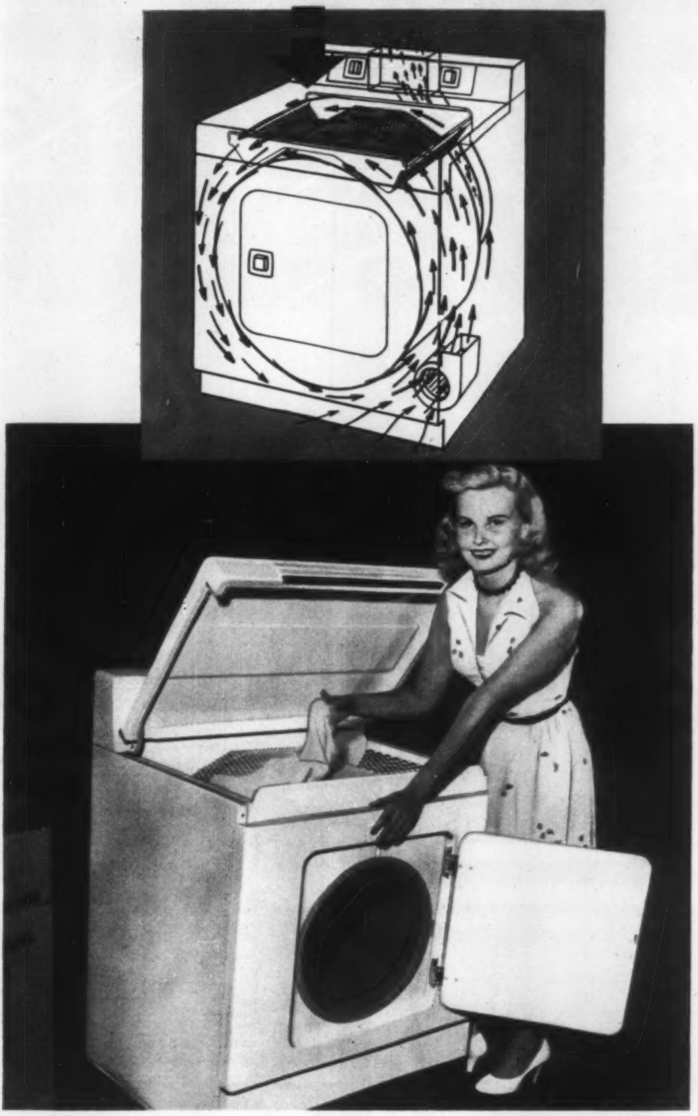
Mr. Overacker . . .

By the end of 1956, the annual capacity for vacuum melted steel should be over 7000 tons, more than double what it is estimated to be now (3500 tons). Unit costs, reduced by larger furnaces, will be brought down more by the use of large, consumable-arc furnaces, similar to those already used to vacuum melt titanium. Some alloys will be produced more economically by vacuum melting than by conventional methods.

Titanium skull furnaces will reduce the cost of fabricated titanium by allowing shape casting and remelting of scrap.

This year should see a big increase in the use of vacuum heat treating. It looks like a natural since it does two jobs: First, gases which impair physical properties, such as hydrogen, are removed. Second, the need for protective atmospheres is eliminated. Applications include: Brazing aircraft "honeycomb" sections and subassemblies and jet engine parts; titanium hydride soldering; annealing high-temperature alloys and zirconium and titanium parts;

How EXPANDED METAL helps dry delicate fabrics



Besides a tumble-dryer for normal laundry, the Rheem-Wedgewood clothes dryer has an exclusive *clothes-saver* feature. In this special compartment, formed from Penmetal expanded metal, precious nylons, fragile woolens and delicate synthetic fabrics may be dried safely in low temperature—without tumbling.

Penmetal expanded metal is ideal material for the *clothes-saver.* It is easily formed and welded; the strands are so smooth they will not damage delicate fabrics; and the open mesh allows the "fluff-breeze" to circulate freely. The diamond truss pattern adds strength to the metal; looks attractive, too, when the lid is up. Yet, Penmetal expanded metal is low in cost.

Penmetal expanded metal is available in carbon steel, aluminum, stainless steel, Monel, Inconel, and other metals. Large or small mesh. Light or heavy gauge.

Why not investigate? Penmetal expanded metal could provide a step toward a better product. Send for 28-page catalog which suggests uses for expanded metal, and gives mesh sizes, weights and dimensions.

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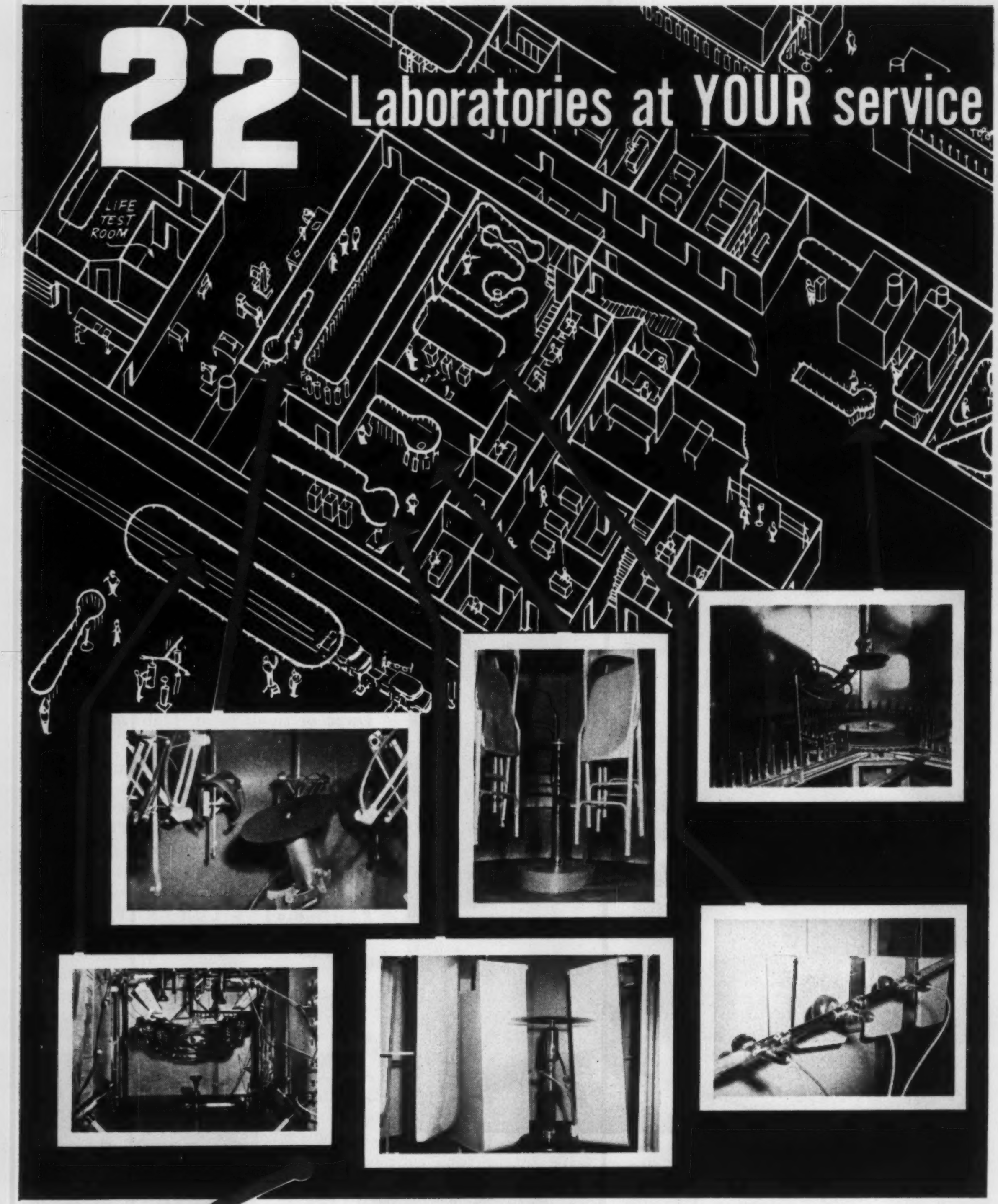
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● **First,** Ransburg sales engineers will make a survey in your plant to check the possibilities of using Electrostatic Spray Painting on your products. Next, you will send samples of your unpainted products—with paint—to the Ransburg laboratories in Indianapolis.

Here, the technical staff takes over. The Ransburg Engineering staff—which includes PH.D's and Masters in Physics, Science, Electrical, Mechanical and Chemical Engineering—makes a complete study of your job. Not only do they have the necessary academic training, but they have the "know how" gained from years of actual experience in the field. Ransburg, you know, was the pioneer in Electrostatic Spray Painting 15 years ago. Engineers and well-qualified technicians have at their disposal every facility for conducting complete tests, simulating your own production conditions. They'll decide which type conveyor is best suited for your job. (There's a conveyorized lab set-up—22 in all—to handle products ranging in size from automobile bodies and chassis to small components, such as window hardware.) They'll design workholders, if necessary, and determine exactly how your job can be run to your best advantage. Details, such as fixture spacing, will be worked out too.

After preliminary studies and tests, you are invited to Indianapolis to see your job run in the lab. If you wish, photos and even movies of your test run can be made and furnished for your own production people to study. You see first-hand what Ransburg Electrostatic Spray Painting can do for you in your own plant.

YOU GET PAINT AND LABOR SAVINGS

Paint usage is accurately measured during the demonstration. The Ransburg No. 2 Process will provide savings up to five times the paint mileage of hand spray. And, one unit can do the work of many hand sprayers. You will see the improved, uniform quality of the work . . . you'll know what kind of increased production to expect, and you can recognize labor savings. ALL OF THIS WITHOUT OBLIGATION.

Ransburg service doesn't end there. After the equipment is installed in your plant—with our supervisory help—we will train your operator and continue to work with your finishing department. Our technically-trained field service engineers are always available to assist with any of your finishing problems.

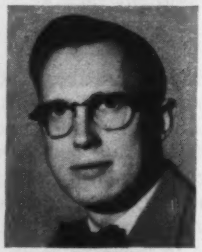
Briefly, that's our story. Now it's your move. Call or write **Dept. S.**

M. F. GARWOOD
Chief Materials Engineer
Chrysler Corp., Detroit

R. E. PARET
Committee of Stainless Steel Producers, American Iron and Steel Institute, New York

F. B. RACKLEY
President, Jessop Steel Co.
Washington, Pa.

W. E. KNAPP
Vice President, American Metallurgical Products Co. Inc., Pittsburgh



W. E. JONES
Manager, Vacuum Melted Products
Carboloy Dept., General Electric Co., Detroit

sintering tantalum, molybdenum, zirconium, titanium and other "refractory" metals; and removing hydrogen from titanium jet engine and aircraft parts.

Mr. Garwood . . .

Many of us responsible for materials selection in the automotive industry feel that expanded use of light alloys, particularly aluminum and magnesium, is imminent. They offer numerous advantages, only a few of which have been given the attention they deserve. Their light weight, resistance to corrosion and decorative values have been universally recognized but not fully exploited.

Furthermore, we do not believe that the economic advantages that can accrue from the proper use of aluminum and magnesium are fully appreciated. This advantage is, perhaps, the most important of all, and any future improvements in the light metals cost picture will serve to make it more apparent.

Our experience indicates that only three light metal fabrication processes—castings, (both die and permanent mold), hot extrusion and impact extrusion — satisfy all the demands of our industry for functional parts. Thy are readily adapted to the high-production, low-cost automation concept.

Mr. Paret . . .

While 1955 was a year of unprecedented production and expanding use of stainless steel, 1956 may see new records.

The architectural field promises to provide the fastest growing new use for stainless. The automotive industry, largest user of stainless mill products, shows every indication of making 1955 a banner year; expectations for 1956 are bright.

Last year saw a broad revision of American Iron & Steel Institute compositions and the introduction of types 201 and 202 into the stainless. With a lower nickel content, they give every indication of equaling the chemical and physical properties of the higher nickel austenitic types, while offering higher mechanical properties.

This year also will see porcelain enameled stainless make its debut in the architectural field. High-speed aircraft, such as the Bell X-2, are expected to use the high strength and heat resistance of stainless as a "new" material for airframes.

Mr. Rackley . . .

A reduction in tooling costs means increased profits. To this end, rolled, composite die sections and knife sections are being used.

Less tool steel is consumed; there is a positive reduction in machining time; machining can be performed after heat treating; and the soft backing of the composite section serves as a cushion, reducing the possibility of edge breakage. Less distortion is experienced from heat treating.

These products are designed for the automotive, appliance, television, radio and shear knife industry. They are used primarily for trim dies, blanking dies and shear knives.

Mr. Knapp . . .

The increased use of leaded steels for machinability will cause a more serious scrap contamination problem in austenitic stainless steel heats. As little as 0.003 per cent lead makes some grades wholly unworkable. Some manufacturers are paying high premiums for lead-free fluorspar, excessive scrap analyses, hand selection and spectrographic analyses for lead while the heat is in progress.

It is now known that addition of rare-earth-metal alloys in the ladle permits good workability with lead contents three or four times higher than the former tolerable limit. In some nonferrous alloys, such as cartridge brass (70 copper-30 zinc), an addition of rare earth metals will permit hot working of thick slabs with lead contents at least as high as 0.1 per cent. The former limit was 0.02 per cent. This is significant because of the copper shortage and the opportunity to use formerly rejected scrap.

Mr. Jones . . .

Growth of the specialty metals industry through vacuum melting and casting is one of the outstanding advances in steelmaking. Practically every industry is reaching for improved materials as a lever to gain optimum performance in the final product.

In industries such as aircraft and land gas turbines, the trends are: Higher operating temperatures, with attendant material problems; more power per unit of weight; greater operating stresses; and the requirement of longer life between overhauls and shutdowns. Improved bearing performance in many products is

How to pick the 1 tubing steel out of 24 to give you longest tube life per dollar

Ask the experts!

OF THE 24 different high-temperature tube steels the Timken Company offers to solve your heat, pressure, corrosion and oxidation problems, *one* analysis is most exactly suited to your particular needs, to give you maximum tube life per dollar of cost.

To find this analysis, *ask the experts.*

These experts are the metallurgists of The Timken Roller Bearing Company. The benefit of their more than 20 years of steel research and experience—with emphasis on high-temperature steels—is yours for the asking. They'll help you select the analysis that will give you longest tube life for your money—the only true measure of actual tube steel cost.

Whichever analysis you choose, you can be confident of uniform quality. The Timken Company maintains rigid quality control from melt shop through final inspection.

Why not let the Timken Company's metallurgists help pick the tubing steel that can solve *your* problem? *Ask the experts!* The Timken Roller Bearing Company, Steel and Tube Division, Canton 6, Ohio. Cable address: "TIMROSCO".

This month's report is on:

18-8 STAINLESS

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Silmo
DM
2% Cr.-Mo.
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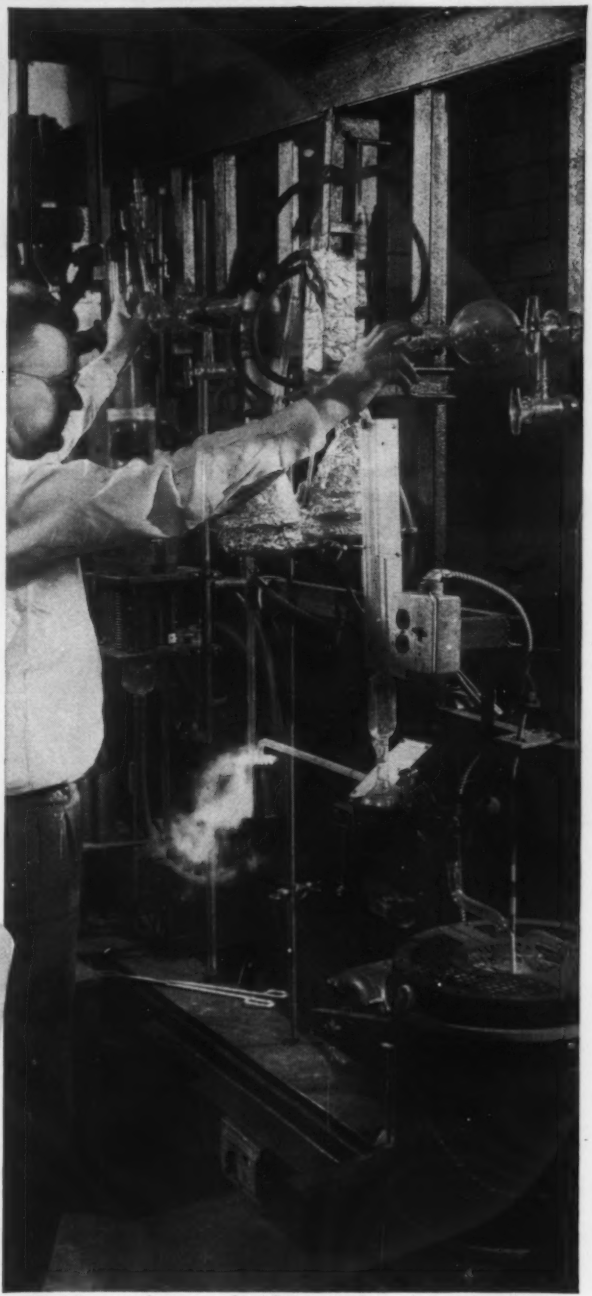
Sicromo 2½
2½% Cr.-1% Mo.
Sicromo 3
4-6% Cr.-Mo.
4-6% Cr.-Mo.-Ti
Sicromo 5S
Sicromo 5MS
Sicromo 7
Sicromo 9M
18-8 Stainless
18-8 Cb
18-8Ti
16-13-3
25-20*
25-12*
35-15**
16-25-6**

* *Available as seamless tubing on an experimental basis only.*
** *Not available as seamless tubing.*



To help control exact steel analysis, a steel sample is melted in this vacuum fusion apparatus. Then gases are pumped out, and the amount present in the steel is determined.

YEARS AHEAD—THROUGH EXPERIENCE AND RESEARCH

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H. R. BOATMAN
Quality Control Dept.
Inland Steel Co., Chicago

B. S. OLD
Vice President
Arthur D. Little Inc.
Cambridge, Mass.

often a must, and bolting materials for use at 250,000 to 300,000 psi are no longer a dream.

The great hope for supplying these materials is vacuum melting. The new technique is in its production infancy.

Mr. Bachner . . .

Two important trends in powder metallurgy are the continued improvements in alloys and the expansion of ferrites and ferrite magnets.

The new alloys have made it possible to expand the application of precision component parts. We are producing gears with a 3½-in. diameter for heavy-duty gear trains in major appliances.

Based on developments at our research center, we have started large-scale fabrication of ferrite components with electrical and magnetic properties required for color television sets, automation control apparatus and other electronic devices.

Mr. Boatman . . .

Manufacturers have welcomed the opportunity to pare down production costs by taking advantage of the increased machinability of lead-bearing steels. This is evidenced by the greatly increased demand for these steels in 1955.

Last year saw development completed and marketing of leadbearing, nonresulphurized, free-machining carbon steel plates. The absence of sulphide stringers, the high machining finish and good weldability have given this steel wide acceptance. Free machining plates are available only in limited quantities.

Little has been done in areas where the inherent lubricating properties of the lead-bearing steel could be used to effect reduction in friction. Gear stock is one suggestion.

Mr. Old . . .

The metallurgist will play a key role in the worldwide race to build nuclear reactors and associated equipment. We have to educate more metallurgists in this up-to-now specialized area. Before low-cost power is a reality, much fuel element development work lies ahead in the metallurgy of uranium, thorium and plutonium and their alloys. The metallurgist must co-ordinate his efforts with the chemical engineer who is faced with the chemical processing of partially spent fuel elements.

In addition, there are many other

LOOK AT THIS UP-TO-THE-MINUTE EXHIBIT OF

POPE PRECISION SPINDLES

EXHIBIT A

POPE SUPER-PRECISION, HEAVY DUTY BORING SPINDLES for boring holes round within millionths of an inch. Available in both belt driven and motorized units to meet a wide range of speeds and horsepower. Send us your specifications for quotations.

EXHIBIT B

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EXHIBIT C

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EXHIBIT E

POPE SUPER-PRECISION MOTORIZED TOOL AND CUTTER GRINDER SPINDLES with clearance Angle Swiveling Heads for Angular Adjustment In A Vertical Plane

EXHIBIT F

POPE HEAVY DUTY VEE-BELT DRIVEN, PRECISION MILLING SPINDLES, and Wheel Heads, ½ to 50 HP

EXHIBIT G

POPE INTERNAL GRINDING SPINDLES for Bryant, Excello, Heald and Landis Grinders.

EXHIBIT H

POPE SUPER-PRECISION HIGH FREQUENCY HEAVY DUTY GRINDING AND MILLING SPINDLES for speeds up to 100,000 RPM

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No. 107

Specify POPE PRECISION SPINDLES

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new metallurgical problems in the moderator, reflector, fuel element canning, control rod, heat exchanger, etc. areas. They involve new metals, such as zirconium, hafnium, beryllium, vanadium, etc., and unique problems in corrosion, radiation damage and other odd phenomena.

Mr. Brennan . . .

Aluminum, a major structural element of airplanes and rockets, is finding increasing uses on the ground. Manufacturers are taking advantage of the metal's resistance to weathering and other forms of corrosion.

Highway signs of aluminum don't rust, rot or splinter. Aluminum extrusions, like the integrally stiffened skin sections used in advanced aircraft designs, are the elements of the new sign face and framing.

Aluminum pipe for irrigation and for draining coal mines has achieved success because of its convenience and over-all economy. Everything that moves or has to be moved should be better if it's lighter. Trains, autos, trucks, trailers and boats are following the trend to reduced weight. Aluminum is one of the chief means being used to do this.

Mr. Roberts . . .

Another hurdle soon may be overcome in improving the performance of tools and dies. Failures through heat checking of aluminum diecasting dies and similar hot work tooling items have been investigated.

In technical reports soon to be published, heat checking will be indicated as a phenomenon primarily involving corrosion fatigue and stress corrosion cracking. Failure occurs at the surface through grain boundary attack and the break-out of individual grains of the die steel. Indications are that improved die finish, closer control of heat treated structures and hardness and better lubrication will aid in prolonging die life. Tests will continue on new steel compositions.

Mr. Boyer . . .

Engineering requirements are demanding more corrosion and heat resisting steels. The focus is on metallurgists who must provide the required properties with less nickel. Result: Several new types of stainless alloys recently have been offered to industry.

Two of these are the newly desig-

B. R. BRENNAN
Supervisor, Engineering Data
Reynolds Metals Co.
Louisvville

G. A. ROBERTS
Vice President-Technology
Vanadium-Alloys Steel Co.,
Latrobe, Pa.

H. E. BOYER
Chief Metallurgist
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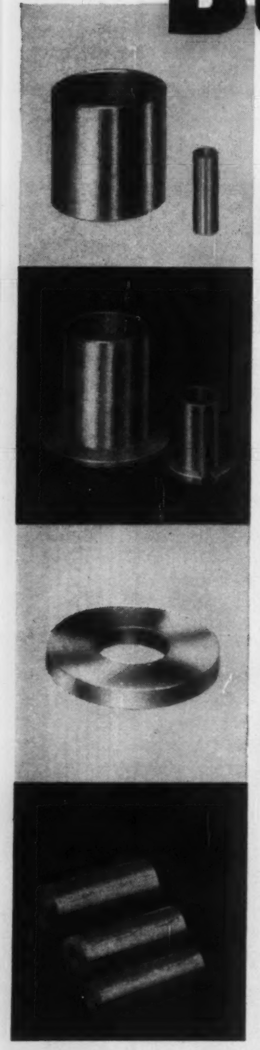

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M. W. DALRYMPLE
Metallurgical Engineer
Bethlehem Steel Co., Bethlehem, Pa.

nated AISI types 201 and 202. They possess about the same percentage of chromium as the 300 series, but less nickel. Higher nitrogen content makes them austenitic at high temperatures and manganese retains the austenitic structure at room temperature.

Another alloy containing a nominal 17 per cent of chromium and an appreciable molybdenum content, but with a marked decrease in nickel, shows interesting properties and promising results. It has excellent corrosion resistance and can be readily hardened to about Bhn-350.

Mr. Dalrymple . . .

For steel bars, blooms and billets, 1955 was a year of urgent demand. All signs indicate this will continue during 1956.

On the consumer front, emphasis will probably continue to be on fast machining rates, close hardenability control and smooth surface of rolled products. The aircraft industry will pursue the search for higher strength alloy steel bars, even though the 300,000-psi level seems to have been attained. Evidence of things to come (or already here) is contained in the question of a young metallurgist at a recent technical meeting: "Have you melted any 300,000-psi alloy steel in vacuum?"

An application for alloy steel which began several years ago and is showing considerable promise is the use of round bars (cold worked in tension prior to use) in prestressed concrete. This type construction is in the Tampa Bay and Gandy bridges in Florida.

Mr. Wilson . . .

For many years, most seamless mechanical tubing to be machined into ring-shaped or hollow cylindrical parts was used in antifriction bearings (for inner and outer races). This is why our company is largest pro-

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BAR MACHINES (9/16" to 7 3/4")				CHUCKERS (5 1/4" to 12")			
Number of Spindles				Number of Spindles			
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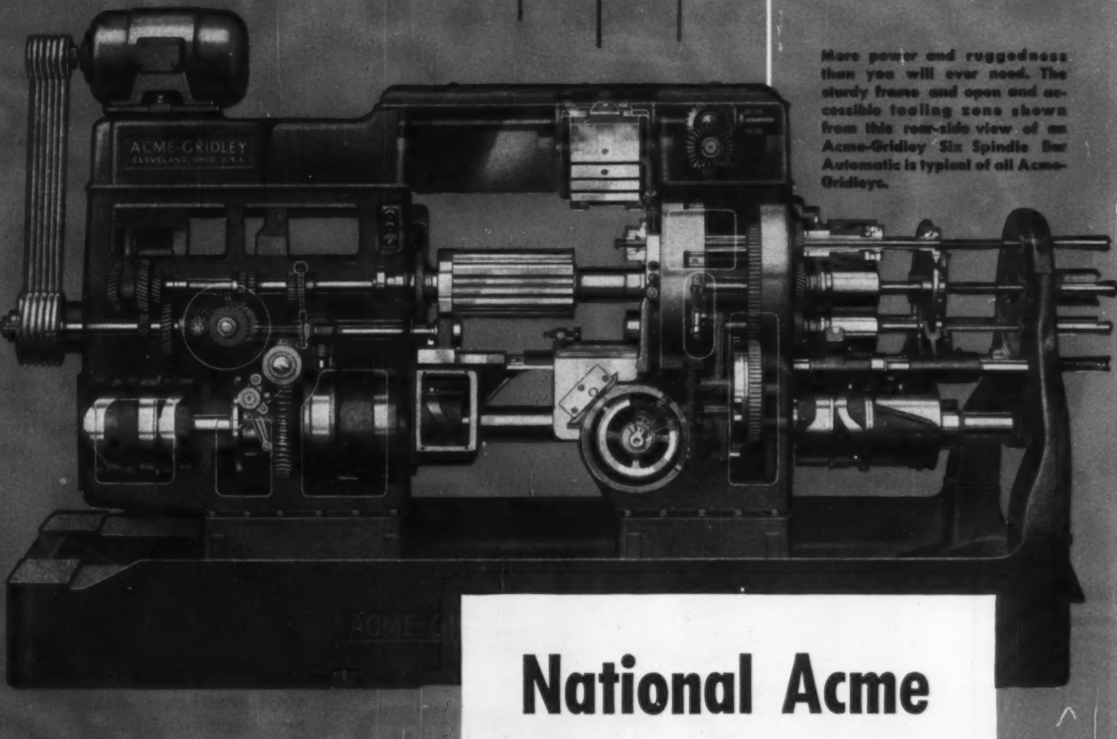
3½"	1"	9/16"	⅝"	12"	10"	5¼"	6"
4¾"	1⅝"	1"	1¼"		12"	8"	8"
5½"	2"	1¼"	1⅝"			10"	
	2⅝"	1⅝"	2⅝"			12"	
	3½"	2"	4"				
	5⅜"	2⅝"					
	7¾"	3½"					
		4"					
		6"					



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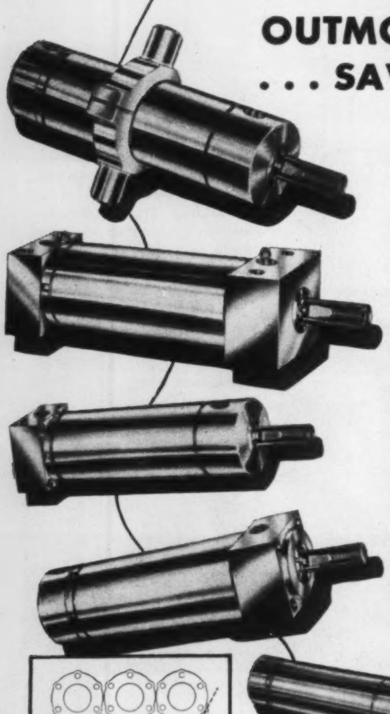

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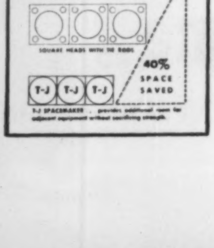

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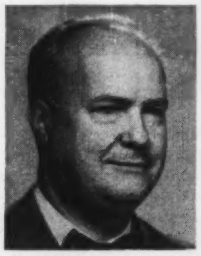

C. E. NELSON
Technical Director, Magnesium Dept. Dow Chemical Co., Midland, Mich.

ducer and user of this material. Since we are specialists in heavy-wall tubing, it was natural that our next field of exploitation should be in gun tubes and large diameter, heavy-wall tubes for tool joints, drill collars and similar oil field equipment.

Now an immense market is developing in automotive uses for seamless tubing. This has been due largely to the automatic transmission and its extension to small cars. It is estimated about two-thirds of the 1956 cars will have automatic transmissions.

The newest transmissions are being designed for gears made from tubing. As a result, there recently has been an astonishing increase in the number of such parts per transmission. For instance, in mid-1954, we knew of a total of 23 parts in six different transmissions. A year later, 28 parts were used in one transmission. The prospect is that the tonnage of seamless mechanical tubing for these applications will be doubled in the next year.

Mr. Nelson . . .

Commercial uses of magnesium accounted for a record 53 per cent of consumption in 1955. Luggage made of magnesium sheet, with bonded vinyl coatings, was the outstanding new commercial usage.

Truck body production is another area of anticipated growth. Wrought,

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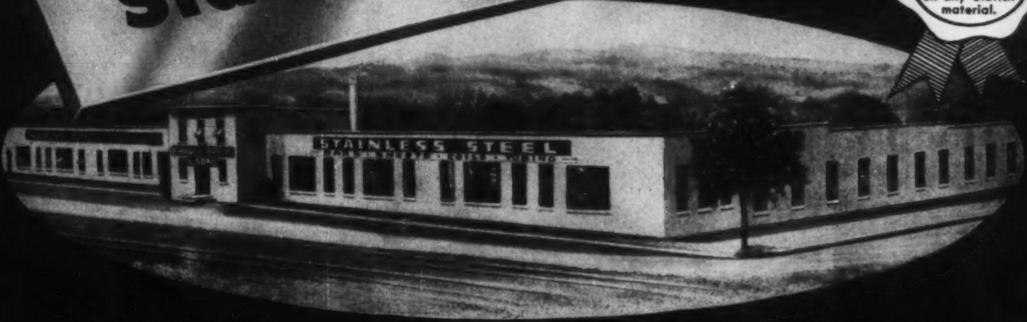
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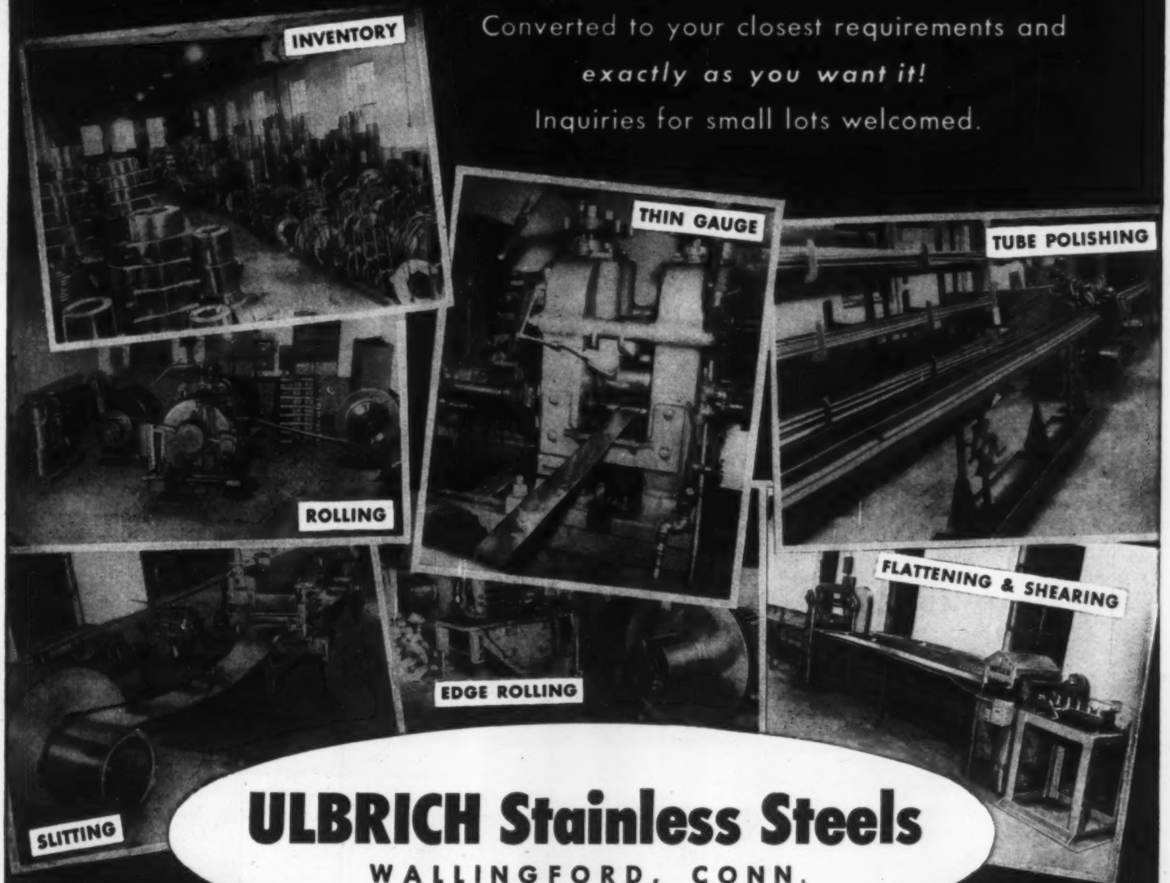
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C. W. LUFCY
President, Dynacor Inc.
Kensington, Md.

thorium-containing alloys for high temperature use were a new development last year. Work will continue in this field, as well as in the development of higher strength alloys for room temperature use.

Another area to watch will be magnesium electroplating. The successful plating of well over a million magnesium rule cases has proved the process is commercially feasible.

A new magnesium anode known as Galvomag was introduced last year. Its higher voltage output reduces the number of installations required for effective sacrificial protection of structures.

Mr. Lufcy . . .

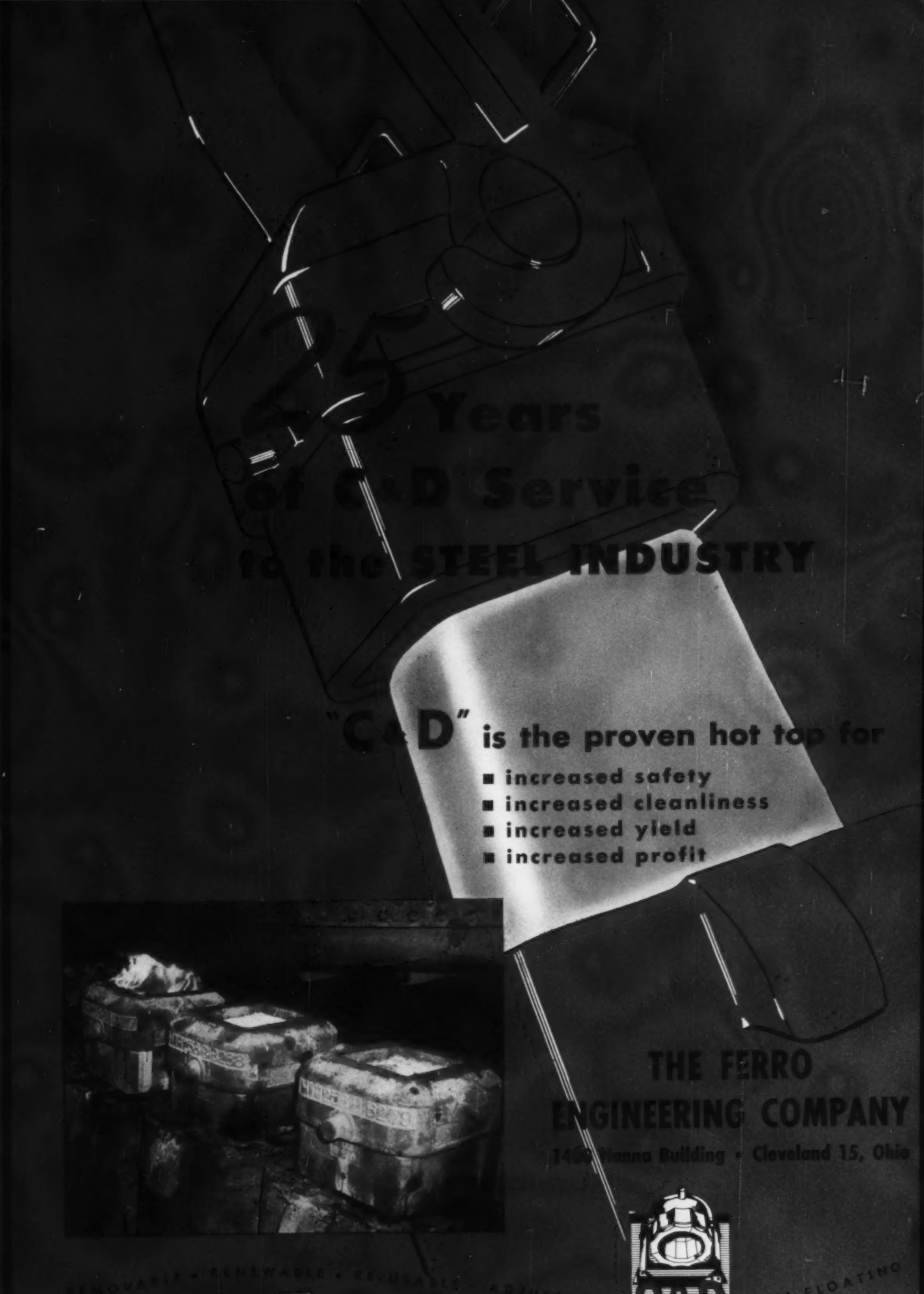
The use of vacuum and controlled atmosphere melting equipment will be an important factor in further improvements in the quality and quantity of magnetic alloys of all types.

Today's requirements for high permeability magnetics continue to be met by the use of the permalloy, permenvar and permendur-type alloys, all of which contain high percentages of critical nickel or cobalt. Nonstrategic alloys, such as the aluminum-irons (Alfenol) and high-silicon-content, silicon-irons, haven't appeared commercially in sufficient quantities to warrant consideration as substitute materials in the immediate future.

While governmental restrictions definitely limit free use of the high-nickel and cobalt-bearing magnetic alloys, the total percentage of these strategic elements so consumed is small enough that ample quantities are expected to be available to meet growing demands.

Mr. Jackson . . .

During 1955, the metallurgist found himself plagued with many problems



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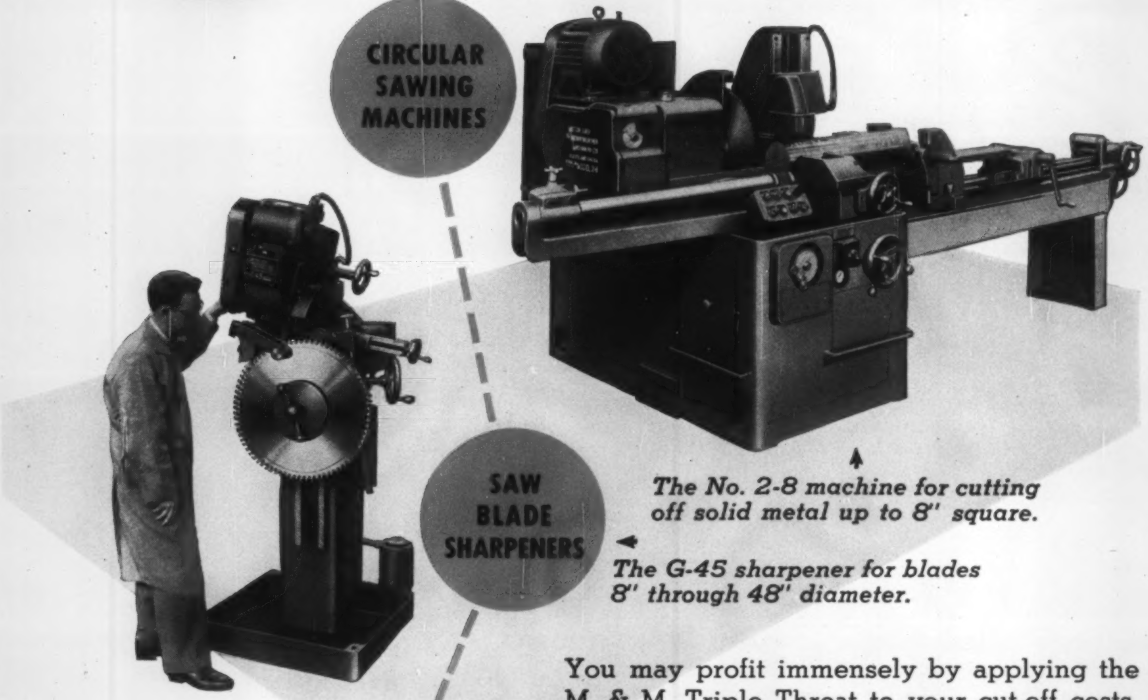
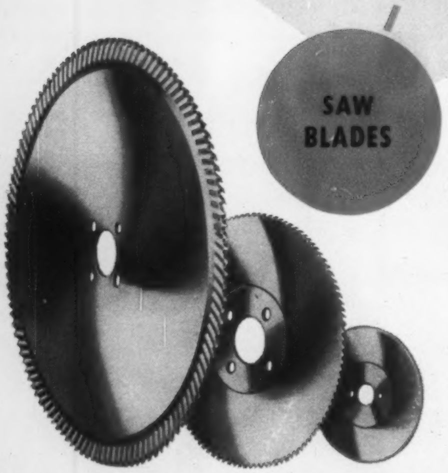


The No. 2-8 machine for cutting off solid metal up to 8" square.

The G-45 sharpener for blades 8" through 48" diameter.



M. & M. saw blades cut any machinable metal. Cut-off blades: segmental — 11" through 120" diameter; solid — 8" through 20" diameter. Slitting saws — 3" through 8" diameter.

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J. H. JACKSON
Manager-Metallurgy, Battelle
Memorial Institute, Columbus, O.

like the ones he had during the Korean War. Most materials became short and talk of substitutions began again.

The most serious threatened switch came when the communications industry pointed out that it probably would be forced to use aluminum if copper prices and availability were not straightened out soon. On the other hand, both columbium and cobalt seemed to become more available. There was talk of finding new applications for these metals, and consideration was being given to the development of new columbium or cobalt-base alloys for high temperature use.

Consumption of titanium mill products started up again after the level-off in 1954. This improvement was partly due to improved quality and uniformity of titanium mill products. A bigger reason was the authorization of higher costs by the Air Force for airframes and engines that use titanium. An important development was the establishment by the Department of Defense of the Titanium Metallurgical Laboratory—a clearing house for technical information.

Mr. Parker . . .

Boron steels have taken their places as standard steels. Others still in the development stage (but beyond the experimental stage) are accepted as tentative standards. High-manganese stainless steels with minimum nickel content also have been accepted. These successes point to further developments in ferrous metallurgy.

Problems surrounding the use of ferrous metals in the generation of atomic power have increased. Important, but not understood, changes occur in a variety of steels when subjected to neutron irradiation. After irradiation, new materials emerge which exhibit new mechanical characteristics. There is no adequate ex-

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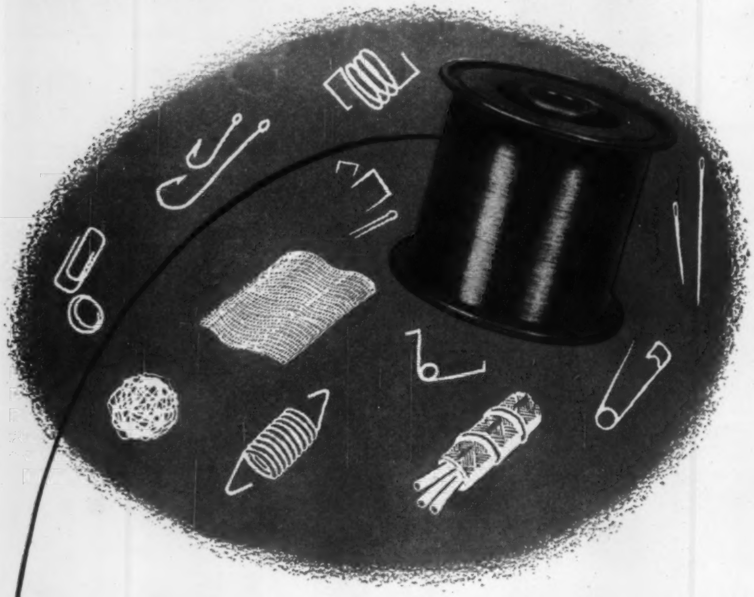

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ALLOY METAL WIRE DIVISION

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H. K. PORTER COMPANY, INC.
Prospect Park, Pennsylvania

C. M. PARKER
Asst. Vice President, American Iron & Steel Institute, New York

J. R. WILLARD
Sales Engineering, Aluminum Co. of America, New Kensington, Pa.

planation of the mechanism or the true meaning of the changes.

There are efforts under way to standardize reactor materials. Such a move would seem ill advised at the moment. Standardization is a product of maturity to be entered into after a high percentage of the facts concerning manufacture, use, service life and performance are known.

Mr. Willard . . .

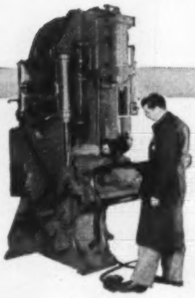
Consumption of aluminum in transportation and architecture took another upward swing in 1955. The construction industry, in fact, eased ahead of transportation as the chief user of aluminum. There has been continued enthusiastic acceptance of aluminum as a wall facing. Aluminum-clad buildings in the U. S. have passed the 300 mark.

In transportation, railroads are using more aluminum in such applications as General Motors' Aerotrain and Pullman Standard's Train X, to be unveiled this year. Busses are using more colored and natural finished aluminum; autos are using it for grilles, side trim, emblems, window frames and other places where an eye-catching finish is desired.

Aluminum conductors are receiving greater attention in the electrical field where economies and new techniques give aluminum an advantage over many materials of higher cost.

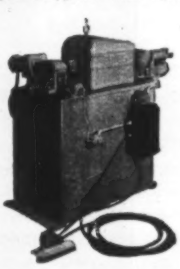
4 COST-CUTTING SOLUTIONS

FOR FABRICATORS OF TUBING, PIPE, MOLDINGS AND EXTRUDED SHAPES



PINES 20-TON BENDING PRESS—Speeds production of automotive tail pipes, completes some jobs 50% faster by eliminating work handling. Up to 10 bends produced in a single progressive operation, most jobs completed in one handling.

PINES SEMI-AUTOMATIC BENDER—Capacity up to 300 bends per hour, for applications where output does not require speed of fully automatic machines. Hydraulic power assures accurate, highly uniform results. Economically tooled, easy for women to operate, requires up to 60% less floor space.



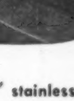
PINES END-FINISHING MACHINE—3" capacity, floor-mounted unit with air clamping. Speeds deburring, facing, pointing, or light hollow mill turning. Available with manual or air spindle advance. Other units also provided for smaller and larger work.

PINES SIZE 4 BENDER—Now cold forms ultra-thin 4" x .020" stainless steel tubes for aircraft to 8" c/l radius. Ability to form these sharp, small radius bends without wrinkles saved $14,000 per plane for an aircraft manufacturer.

● Since 1941, when Pines Automatic Hydraulic Bending Machines were first introduced, more and more plants fabricating tubing, pipe, rods, moldings, rolled and extruded shapes, have found it profitable to standardize on Pines Machines. Dependable accuracy, combined with fast, more efficient operation are two of the major reasons why hundreds of commercial and industrial plants have turned to Pines to find cost-cutting solutions to bending and end-finishing problems. A study of the four examples shown here may suggest how you may profitably take advantage of the latest developments in fabricating the "Pines-way".

WRITE FOR *Free* DATA SHEETS

For additional cost-cutting ideas, write today for free copies of "Pines News"—illustrates latest bending and end-finishing techniques applied to actual jobs. And call on Pines engineers for assistance on any job.



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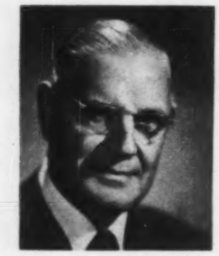


E. G. DE CORIOLIS
Director of Research
Surface Combustion Corp.
Toledo, O.

C. H. STEVENSON
Lindberg Engineering Co.
Chicago

E. W. CUNNINGHAM
Manager, Industrial Heating Dept.
General Electric Co.
Shelbyville, Ind.

HEAT TREATING

FORUM ON TECHNICAL PROGRESS

More heat treating is being linked with other production processes . . . austempering and martempering grow . . . fast heating assumes more important role . . . controlled atmospheres expand and invade lower temperature ranges . . .

Mr. Holcroft . . .

Industry is challenging heat treating furnace manufacturers to come up with new furnaces and methods. Reasons for this trend:

1. The development of new metals and alloys, such as titanium. Completely different equipment must be designed.
2. Materials handling methods must be improved to keep up with automation.
3. Controlled atmosphere heat treating is expanding and is invading the lower temperature ranges.

Furnace makers must call upon all their engineering know-how, research and development facilities. One help has been the development of a new gas generator capable of a wide range of applications and extremely low dew points.

Mr. De Coriolis . . .

The rapidly increasing use of aluminum has placed new and more severe demands upon the manufacturer of industrial furnaces. He is called to produce equipment to meet much larger production requirements and more stringent standards of production quality.

The trend in the basic aluminum industry is toward heat treating and quenching thicker plates for aircraft use, to meet the increased demands for higher flight speeds. Aeronautical engineers want aircraft structural aluminum components of extremely high strength.

Developmental work directed toward the heat treatment of plates which are 4 in. thick x 10 ft wide x 50 ft long and larger is under way. The desired solution treating temperature, plus or minus 5°F, has been reached by ultra-high-speed convection heating. The quenching operation requires ultrahigh heat transfer rates between the plate and the coolant.

Mr. Stevenson . . .

Last year was one of automation in the industrial furnace industry. Automatic temperature control has replaced manual control; pack carburizing has given away to gas carburizing; carbonitriding has replaced cyaniding. The greatest benefit of these changes is the assurance of uniformity and maximum quality.

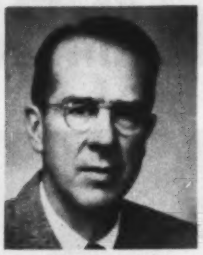
Today, we also have automatic atmosphere control. Automatic, batch-type carbonitriding furnaces this year will be producing millions of pounds of uniform, high-quality parts at lower-than-ever costs. Continuous carbonitriding furnaces will even eliminate the job of charging and discharging the parts. Instruments will automatically control furnace and quenching temperatures, carbon potential and flow of atmosphere. They will time the phases of treatments and automatically energize the various moves of the cycle. They will stop the operation and call the operator if the cycle is interrupted. With the new, low-voltage elements developed last year, carburizing and carbonitriding will be done electrically.

Mr. Cunningham . . .

Development of heat resisting alloys for aircraft, missiles and jet engines will further expand furnace brazing in protective atmospheres. New brazing metals, such as alloys of chromium and boron, are being developed to withstand this high-temperature service.

The growing demand for magnetic steel will require completely automatic annealing furnaces. Continuous furnaces, such as mesh belts and roller hearths, will be used with automatic charging and discharging, transfer tables and return conveyors.

Steel industry expansion and modernization will require more high-speed furnaces for annealing and galvanizing steel strip. These continuous furnaces permit a high output in a minimum floor space, a bet-



L. B. ROSSEAU
Vice President, Ajax Electric Co.
Philadelphia

H. N. BOSWORTH
President, Metal Treating Institute
New Rochelle, N. Y.

C. L. IPSEN
Executive Vice President, Industrial
Heating Equipment Assn. Inc.
Washington

E. E. STAPLES
Executive Vice President
Hevi Duty Electric Co., Milwaukee

ter product, less handling, a shorter cycle and less in-process inventory than batch furnaces.

We will see more furnaces which combine heat treating operations. For instance, preheating, annealing, brazing, hardening, washing and tempering, with intermediate cooling and quenching, may be combined in one continuous pass. A new three-zone, roller-hearth furnace copper brazes and hardens parts in one operation—increasing production five times without any increase in personnel.

Mr. Rosseau . . .

Salt bath processing continues to expand, particularly in the automotive and aviation industries. Salt quenching equipment for austempering and martempering is becoming increasingly popular. The two decided advantages of the salt quench—minimized distortion and superior hardness-toughness ratios—are being recognized by more and more metallurgists.

A typical, high-production martempering installation that was started last year uses four mechanized salt bath lines, each over 70 ft long. Within strict dimensional limits, it hardens automatic transmission parts machined from low-carbon, low-alloy, low-hardenability steel. One part, a tubular shaft, 1¼-in. OD by 14-in. long, can not be more than 0.004-in. total out of round following martempering. Results show that distortion due to martempering alone is within 0.002-in., and the parts have a uniform hardness of Rc 37 to 42, usually within a 2-point hardness spread.

The inherent advantages of molten salt as a heating medium (surface protection, fast and uniform heating by conduction) have led to the use of salt baths for the heat treatment of materials used for atomic fuels.

Mr. Bosworth . . .

Equipment in the commercial metal treating industry is usually not designed around a particular part, but around a process; it is mainly process engineering and production. It means the right selection of equipment that will have greater flexibility with emphasis on automation for economy.

Accuracy and control in metal treating will be expanded in quenching. Greater capacity, control and flexibility will be achieved in quenching to eliminate or minimize the distortion and amount of final finishing after heat treating.

The metal treater will have to continue to educate and train personnel to keep pace with the rapid strides being made in automation.

Mr. Ipsen . . .

Technological improvements, new applications and the growing need for mechanized and automated equipment sparked a spectacular increase in demand for industrial heating equipment during 1955.

New orders in 1955 were 195 per cent of 1954 orders. They even surpass the war year of 1952 by 17 per cent. (Figures are for first ten months of each year.) The average of estimates by members of the Industrial Heating Equipment Association places 1956 volume of new orders at 87.5 per cent of 1955. This still represents a healthy volume of business equal to 171 per cent of orders in 1954—a good peace-time year measured by past standards.

Heat treatment of steel plate and structural shapes to obtain increased physicals is opening up a new field for furnace applications. Placed in operation last year was a 25-ton-per-hour roller hearth furnace for heat treating and pressure quenching plate up to 3-in. thick, up to 14 ft wide and 45 ft long.

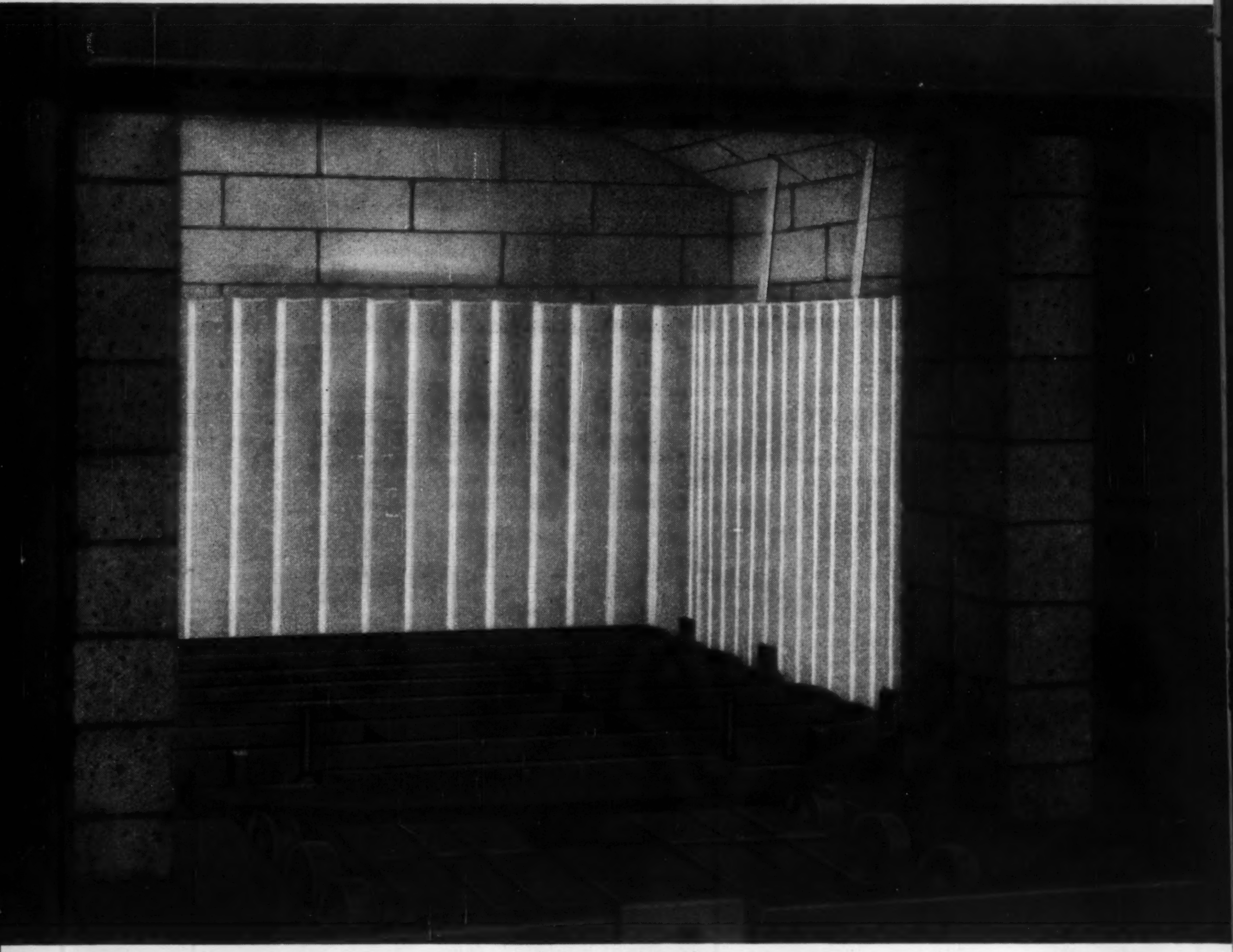
Heat treat furnaces are being linked to other production equipment, to eliminate manual handling of heat treated and tempered parts, from machining operations to final delivery. Automatic carbon potential control of protective atmospheres guarantees correct and uniform hardness of all parts. With protective atmospheres, parts come from the furnace with a bright finish. Martempering and austempering in new, high-velocity quench baths reduce distortion.

Mr. Staples . . .

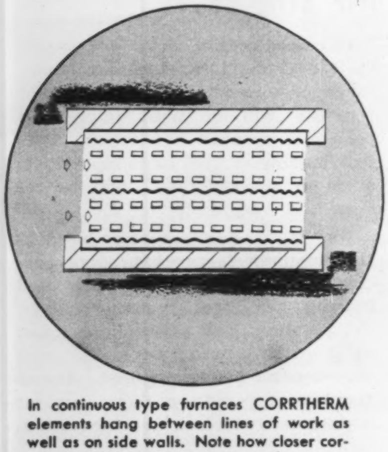
Increased uses of atomic power will up the demand for uranium metal for fuel elements. New types of furnaces will be used in several phases of uranium production. Perfect brazing of fuel element casings, made of several alloys, will be required.

New aircraft gas turbine production requires furnaces to give precise results in heat treating and brazing new heat resisting alloys. Temperatures and atmospheres must be controlled in a range and to a degree never before required. Manufacturers are setting tolerances for distortion control and surface condi-

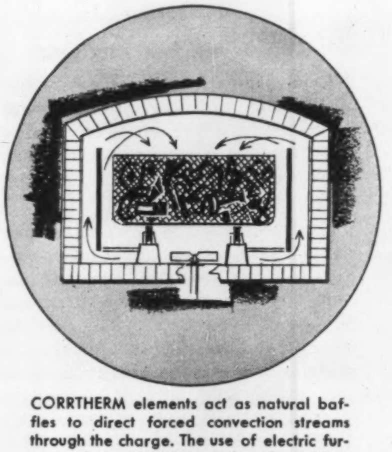
BRAND NEW—MODERN ELECTRIC ELEMENT



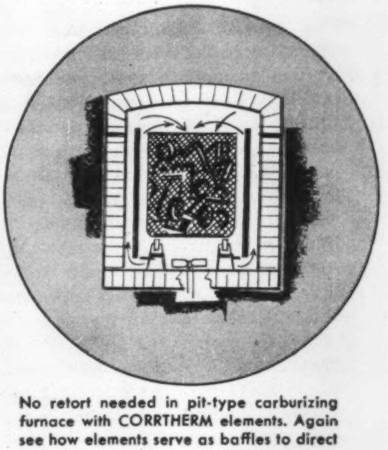
This shows graphically how the new Lindberg CORRTHERM electric heating element actually fills the furnace with walls of glowing heat. Note also that CORRTHERM is conveniently hung from simple brackets requiring no complicated connections or construction. This element operates at extremely low voltage, eliminating shock or short hazards.



In continuous type furnaces CORRTHERM elements hang between lines of work as well as on side walls. Note how closer corrugations (at each end of element) compensate for incoming cold work and door losses.



CORRTHERM elements act as natural baffles to direct forced convection streams through the charge. The use of electric furnaces for carburizing and carbonitriding now becomes completely practical.



No retort needed in pit-type carburizing furnace with CORRTHERM elements. Again see how elements serve as baffles to direct forced convection stream through charge.

FOR LINDBERG FURNACES

Never before has there been an electric heating element like this CORRTHERM by Lindberg. Its revolutionary advantages now make the use of electricity as the source of heat, practical, efficient and economical for all heat treating processes.

Ideal for use in any electric heat treating furnace, CORRTHERM elements have particular advantages for carburizing and carbonitriding. This new element completely eliminates problems formerly created by the use of electricity in these types of furnaces. These exclusive advantages of CORRTHERM explain how and why:

LOW VOLTAGE: Operates at extremely low voltage. No leakage through carbon saturation. Around Lindberg we talk about it as the electric element "without any electricity . . . to speak of!"

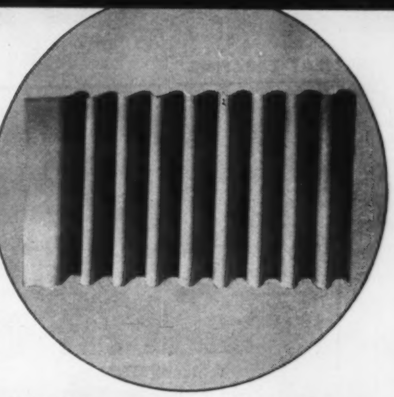
ATMOSPHERE CIRCULATION: Elements act as baffles to direct circulation of convection streams.

SAFETY: Extremely low voltage also eliminates shock or short hazards.

DURABILITY: Watts density at all-time low. Element practically indestructible. Work load or operator's charging tool can't hurt it.

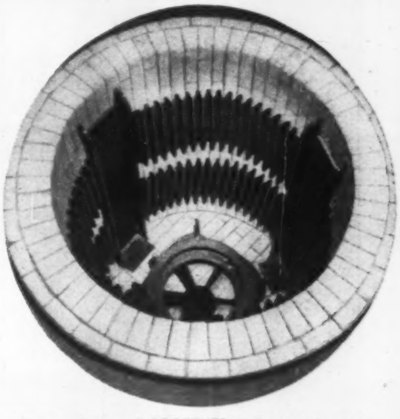
EASILY INSTALLED: Element is not enclosed, just hangs in furnace. No complicated mountings required.

If electricity is the preferable source of heat for your metal treating processes find out how advantageously CORRTHERM elements can be applied to your requirements. Just get in touch with your nearest Lindberg Field Representative. (Consult your classified phone book.)



CORRTHERM elements are large sheets of corrugated nickel chromium. They were developed in Lindberg laboratories by Lindberg metallurgists and engineers.

This shows installation of CORRTHERM elements in one of two large rotary furnaces currently being erected in the field by Lindberg's associate company, Lindberg Industrial Corporation.



An installation of CORRTHERM elements in a carburizing pit-type furnace. Simplicity of mounting makes replacement easy and economical.

LINDBERG

LINDBERG ENGINEERING COMPANY
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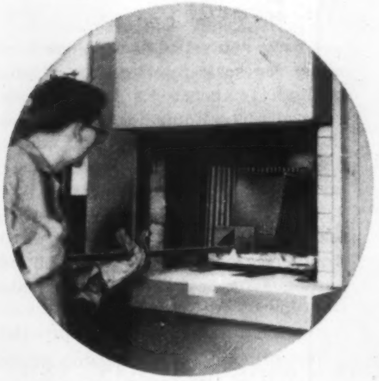

Safety! Extremely low voltage makes CORRTHERM elements completely safe. Let operator or work load bang it if they will. Neither element nor operator will be hurt.

CORRTHERM

by LINDBERG

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Vice President, Lee Wilson
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IRVING DICKTER
Chief Metallurgist, Process Machinery
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W. K. LOMBARD
Sales Manager, Thermal Research &
Engineering Corp.
Conshohocken, Pa.

HORACE DREVER
President, Drever Co.
Bethayres, Pa.

tions heretofore considered impossible.

The practice of brazing stainless steel has become more standard. Uses of temperatures in excess of 2100° F and dry atmospheres are more common. Vacuum is being used in place of atmosphere in more cases.

New demands for more highly engineered furnaces with special features place great burdens on engineering departments of furnace builders in this period of high industrial activity.

Mr. Whitten . . .

Acceptance of the single-stack, portable-base furnace for annealing strip coils is evidenced by the sale of about 150 units in 1955 on the domestic and foreign markets.

Continued research on fuel input, more effective convection transfer and the perfection of the entire convection system have continued, giving improvements in performance. The diffuser assembly, which expands gases from the fan uniformly at low energy loss, has been improved to increase the pressure and velocity of the gases along the inner cover without throwing sand from the seals.

Investigation of heat transfer through the flow path in convector plates indicates possibilities of more rapid heat exchange from these units. The design trend is toward further perfection of the single stack annealing system. Purpose: To improve the uniformity of large coils made at the high production rates now common in the strip mills. The high convection system also is increasing production in the wire industry.

Mr. Dickter . . .

Emphasis on automation this year will create an increasing demand for flame hardening equipment.

Flame hardening makes it possible to use less expensive materials, reduce the number of operations to make a finished part and the process lends itself to a high degree of automation. The equipment manufacturer is striving to produce high-production, special-purpose equipment and universal tooling for faster and more economical production of small lots. Attention is being given to the design of equipment, with emphasis on interchangeability of all types of tooling for low-production shops.

We can expect to see simplification of design in localized gas heating applications. We should look forward to more economical usage of gases through improved accuracy in mixing and simplification of burner design. Easier maintenance is another factor which is being stressed in design.

Mr. Logan . . .

It's not the heating problems that must be solved today. It's the adaptation of the heating process to a specific job, to cut operating costs by reducing manpower, increase production and improve quality. In heat treating, we see induction equipment as part of a machine. In forging, mechanized induction heating installations are proving of value. Both areas need further exploitation.

Competition in the induction heating industry is increasing, too. This helps users. It means more and faster developments. Today, there are several manufacturers for almost each induction heating process.

Mr. Lombard . . .

The importance of keeping pace with aircraft makers is becoming more vital to the industrial heating equipment industry as aircraft speeds increase. A "thermal" barrier is discussed as much as a "sound" barrier was a few years ago. Last year saw prototypes of heating equipment for testing critical aircraft parts, and 1956 will see production versions as supersonic planes become production items.

Industrial heating equipment makers will be called upon to design environmental test equipment, production heat treating furnaces and ovens and heat exchangers which permit testing under conditions of the "thermal" barrier, where possible, before aircraft is flown.

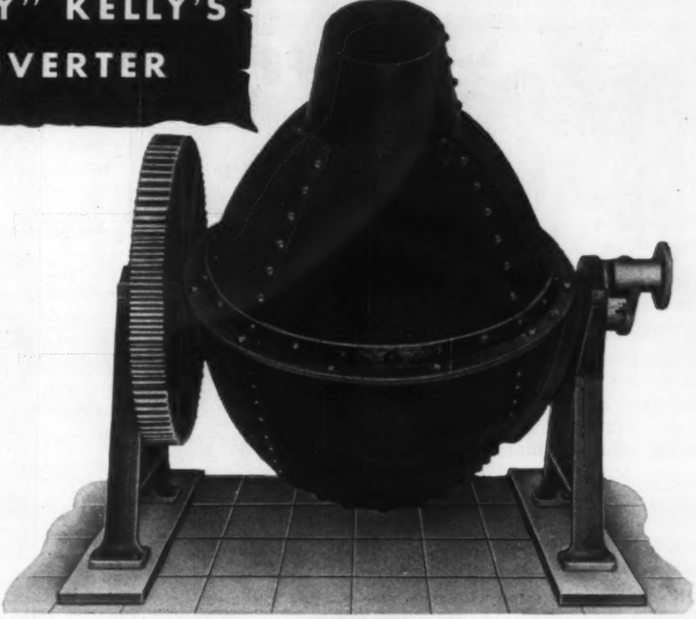
Mr. Drever . . .

A new, controlled-atmosphere technique for scale-free heating of steel at high temperatures has been developed. The Equiverse furnace uses the same burners to heat and to create a scale-free atmosphere when operating at temperatures up to 2350°F for forging or reheating. In addition to scale-free heating, the Equiverse system combines the advantages of improved heating rates and lower fuel consumption, when compared with conventional practice.

The principle of this system is the operation of burners at about 50 per cent the amount of air required for

FAMOUS FIRSTS IN THE IRON & STEEL INDUSTRY

"CRAZY" KELLY'S CONVERTER



In 1847 William Kelly started experimenting to find a cheaper and more rapid way of refining pig iron by blowing cold air into molten iron. Friends thought his idea was mad, and after several experiments had failed Kelly was sent to Dr. Huggins to be treated as a mental patient. The doctor, however, discovered that Kelly's idea was as sound as his mind and advised Kelly to continue his experiments. Shortly after 1851 Kelly was able to make a malleable iron or steel, depending on the amount of carbon in the metal by his process. Kelly's first converter was put into use at The Cambria Works in Johnstown, Pennsylvania.

In 1854, Henry Bessemer experimented with the same process, unaware of Kelly's work, and he received an English patent in 1855. Later, when he applied for and got an American patent, Kelly heard of this and filed a claim of priority of invention. The Government, in 1857, reversed their original grant to Bessemer and upheld Kelly's claim. Kelly finally sold out his patent to the Bessemer group, whereby came the name Bessemer Converter.

There's no mistaking who originated the first dead-burned dolomite, it was The J. E. Baker Company. Since its beginning BAKER'S MAGDOLITE has been constantly improved until today it is always 5 ways better: Composition, Preparation, Strength, Economy and Quality. The next time you order dolomite be sure to specify BAKER'S MAGDOLITE. You'll find BAKER'S MAGDOLITE will increase a more uniform ingot yield with less defective production material.

7-55

ANOTHER FAMOUS FIRST

JEBCO
PRODUCTS
SINCE 1889

BAKER'S MAGDOLITE

The original dead-burned dolomite

THE J. E. BAKER COMPANY

YORK, PENNSYLVANIA • PLANTS: BILLMEYER, YORK, PENNSYLVANIA • MILLERSVILLE, OHIO

Most Specified as

STANDARD POWER COMPONENTS ON ORIGINAL EQUIPMENT . . .

WISCONSIN HEAVY-DUTY Air-Cooled ENGINES

Single Cylinder 3 to 8¼ hp.

Single Cylinder 6 to 9 hp.

Two-Cylinder 7 to 15 hp.

V-type 4-cyl. 15 to 36 hp.

IN THE FARM FIELD . . .

Specified by leading "blue chip" builders of farm and orchard equipment for: combines, pickup balers, forage harvesters, garden tractors, field crop and orchard sprayers, irrigation pumping units, portable elevators and many other machines.

Wisconsin-powered Model 87 New Holland Baler.

IN THE CONSTRUCTION FIELD . . .

Specified for leading makes of concrete mixers, concrete finishers, concrete cutters, power "wheelbarrows", hoists, bituminous spreaders, ditch diggers and trenchers, road rollers, conveyors, compressors, arc welders, pumping units, standby electric generators, etc.

Wisconsin-powered Smith DeLuxe Truck Mixer.

IN THE OIL FIELD . . .

Widely specified as integral power for many types of oil field utility units such as oil well pumps, gathering pumps, dope kettles, pipe straightening machines, compressors, salt water disposal pumps, trenchers, standby power units, etc.

Wisconsin-powered Oil Field Booster Pump.

IN THE INDUSTRIAL FIELD . . .

Specified for plant floor sweepers and scrubbers; fork-lift, pallet and platform trucks; plant fire-fighting equipment; truck and trailer refrigeration systems; power lawn mowers and leaf sweepers and a great variety of specialized applications in many fields.

Wisconsin-powered Hyster Fork Lift Truck.

Because Wisconsin Heavy-Duty Air-Cooled Engines match the equipment of which they become integral units . . . because they fit both the machine and the job with maximum power advantage and minimum maintenance cost . . . these fine engines merit the serious consideration of design engineers and builders of equipment utilizing engine power within a 3 to 36 hp. range.

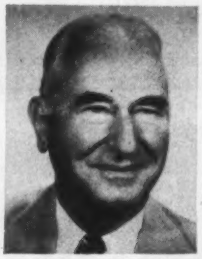
Write for Bulletin S-179 and tell us about your power problem.

MOST H.P. HOURS

WISCONSIN MOTOR CORPORATION

World's Largest Builders of Heavy-Duty Air-Cooled Engines

MILWAUKEE 46, WISCONSIN



P. C. OSTERMAN
President, American Gas Furnace Co., Elizabeth, N. J.

complete combustion. This air is preheated to obtain the high temperatures required. The products of combustion which form the furnace atmosphere are high in hydrogen and carbon monoxide which produces the nonscaling atmosphere. The other 50 per cent of air required for combustion is added in a recuperator which is used to preheat the primary combustion air.

Mr. Osterman . . .

The trend toward increasing usage of the Ni-Carbing process of casehardening continues. Big advantage is the high corrosion resistance it produces.

Mechanized furnaces have found increased favor in metal treating processes. Where articles to be heat processed were hand or hopper fed into a continuous heating machine and discharged into and out of a continuous quenching tank, they are fed from the quench tank into a washing and drying machine, then into a tempering machine in a continuous line. Sometimes additional operations are added to the line.

This automation was employed not so much to save labor as it was forced by the need to make the available labor adequate for the ever increasing production requirements.

Mr. Ipsen . . .

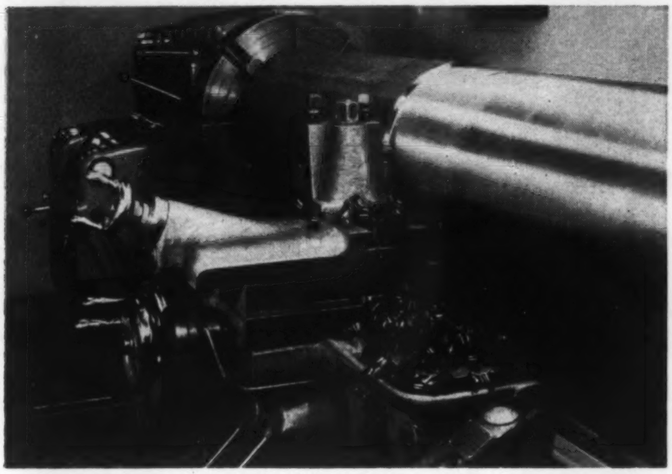
Recent trends in automation, combining heat treating with other processes, have utilized continuous fur-

NEW ... ALL NEW!

CARBIDE
STEEL

FIRTHITE TXH

A heavy-duty, general purpose premium Carbide at no premium price



OUTSTANDING FEATURES OF TXH

- Higher hardness to strength ratio.
- Improved impact resistance.
- Wider range of applications.
- Cooler operating temperatures.
- Higher edge strength.
- Greater resistance to abrasion.

TXH is new, brand new, not just another grade designation for an altered existing grade. It is a completely new concept . . . a combination of materials and processes designed specifically to do heavy duty, high production cutting operations better than they have ever been done before. It does.

During development in Firth Sterling laboratories, FIRTHITE TXH *out-performed* and *outlasted* all other *premium grades of carbide.* After thorough introduction in the field, performance has exceeded laboratory predictions in case after case.

Here is a premium quality carbide developed for an age of automation which, at no extra cost, out-performs and outlasts all others.

Available from stock now in all standard tips and tools. Try it *now* and *prove it yourself!*

FOR ENGINEERING SERVICE CALL YOUR NEAREST FIRTH STERLING REPRESENTATIVE

R-314

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—INC—
GENERAL OFFICES: 3113 FORBES ST., PITTSBURGH 30, PA.
MILLS: McKEESPORT, TRAFFORD, DETROIT, HOUSTON
OFFICES AND WAREHOUSES*: BIRMINGHAM CHICAGO* CLEVELAND DAYTON DETROIT* HARTFORD* HOUSTON LOS ANGELES* NEW YORK PHILADELPHIA PITTSBURGH WASHINGTON WESTFIELD, N.J.

PRODUCTS OF FIRTH STERLING METALLURGY

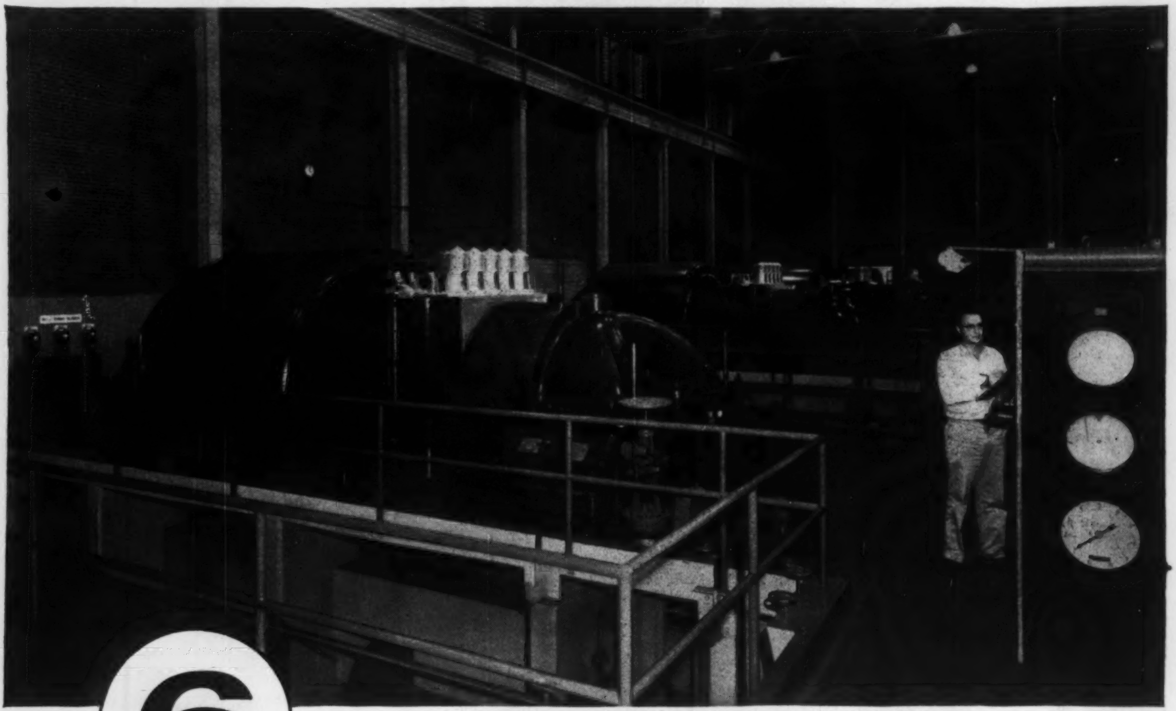
High Speed Steels	Sintered Tungsten Carbides
Tool & Die Steels	Firth Heavy Metal
Stainless Specialties	Chromium Carbides
High Temperature Alloys	High Temperature Cermets

Zirconium

FIRTH STERLING FS TRADE MARK

CALL YOUR FIRTH STERLING DISTRICT OFFICE OR DISTRIBUTOR. ASK MR. TOOLEY.

at U.S. STEEL's Columbia-Geneva Steel Division



6 I-R TURBO-BLOWERS supply BLAST FURNACE WIND

The photo above shows the blowing room at the Geneva Works of U.S. Steel's Columbia-Geneva Steel Division in Utah. Here, four Ingersoll-Rand Turbo-Blowers, each rated 95,000 cfm, 35 psig, supply wind for the blast furnaces at this large, modern steel mill. These four identical blowers, installed in 1943, are driven by I-R steam turbines, each served by an I-R surface condenser.

A thoroughly dependable air supply is of vital importance to assure continuous operation of the blast furnaces. The performance of these units, over the past 12 years, has therefore contributed materially to uninterrupted production at this important western plant.

For year-after-year dependability, it pays to specify Ingersoll-Rand Turbo-Blowers and accessory equipment.

32 YEARS' SERVICE AT IRONTON WORKS

Here, a few miles from the Geneva Works, are two more I-R Turbo-Blowers that are still in successful operation after 32 years of service. Installed in 1923, they were originally rated 42,000 cfm at 25 psig, but the interiors were later rebuilt to increase the rating to 46,000 cfm at 28 psig. Both units are driven by I-R steam turbines, served by a common I-R barometric condenser.

Ingersoll-Rand

11 BROADWAY, NEW YORK 4, N. Y.

IR

12-277

COMPRESSORS • AIR TOOLS • OIL AND GAS ENGINES • CONDENSERS • CENTRIFUGAL PUMPS

H. N. IPSEN
President, Ipsen Industries Inc.
Rockford, Ill.

R. J. PETERS
Chief Metallurgist, Warner Gear Div.
Borg-Warner Corp., Munice, Ind.

naces of various types because of their basic characteristics. In spite of this trend, the design capabilities of the straight-through batch furnace are being realized, and automation installations are being placed in operation.

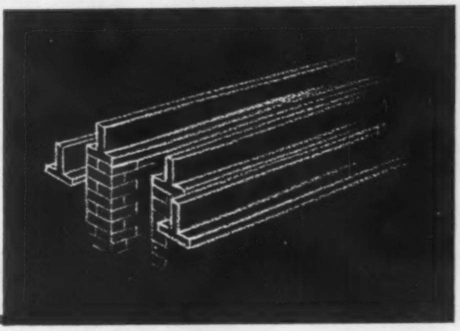
A recent installation in the automotive field integrates two separate lines of these batch furnaces into the production flow of two, completely automatic, processing lines. One line includes preheat, clean harden, quench, wash and draw units; the other, preheat, gas carburizing, quench, wash and draw units. Both lines are tied into an automatic, tray-return system.

The flexibility of the straight-through batch furnace permits single or multizone units to be produced from the same time-proved basic design. They will fit into all types of continuous, automatic production lines.

Mr. Peters . . .

Automation will be increasingly reflected in future considerations of heat treating processes and equipment. Continuous processing will require more stringent quality control

HOLCROFT
and the
WALKING
BEAM
FURNACE



Step up production
of l-o-n-g parts

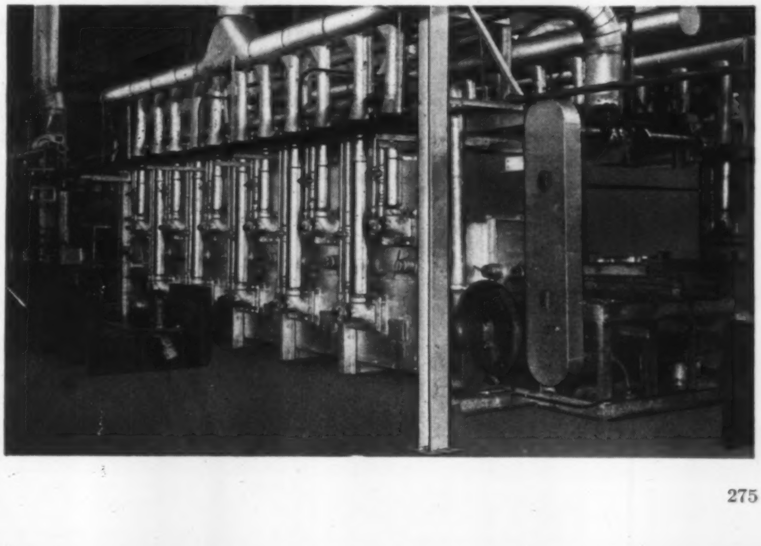
The walking beam furnace is an automatic, high production furnace usually used for treating bar stock, tubes, axles, and similarly shaped products.

Stock handling is ingenious. Two sets of rails—one stationary—run the length of the furnace. The moving set lifts the stock, travels forward, and then drops down below the level of the stationary rails. The rails return to their original position and repeat the action, walking the work through the furnace. An alternate arrangement includes two sets of moving rails. One pair lifts the stock as the second moves backward. The first comes down, deposits the work on the second, which moves forward conveying the work through the furnace cycle.

Yes, there's more to designing a heat treat furnace than a knowledge of metallurgy. Other factors—stock handling for one—must be considered, too. That's why it's a good bet to bank on Holcroft experience. It will pay off in the long run.

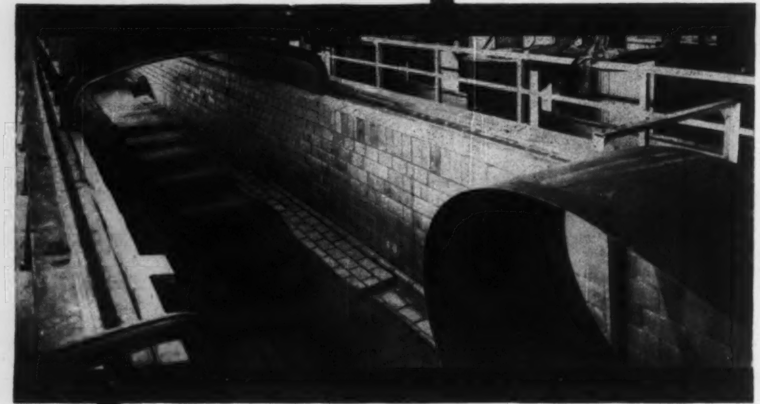
Write for your copy of Blazing the Heat Treat Trail.

HOLCROFT AND COMPANY
6545 EPWORTH BOULEVARD • DETROIT 10, MICHIGAN
PRODUCTION HEAT TREAT FURNACES FOR EVERY PURPOSE
CHICAGO, ILL. • CLEVELAND, OHIO • DARIEN, CONN. • HOUSTON, TEXAS • LOS ANGELES, CALIF. • PHILADELPHIA, PA.
CANADA: Walker Metal Products, Ltd., Windsor, Ontario



your
corrosion
problems

solved



when you use
ATLAS materials
of construction

More than any other, the name, ATLAS, is specified for corrosion proof materials of construction throughout the metal working industry.

In this industry, Atlas materials, engineering and design features have accounted for tremendous savings in maintenance and replacements.

In the last quarter century, thousands of tanks have been built of Atlas materials for use by the metal working industry . . . all types, from small dip tanks to the largest continuous picklers.

Let Atlas help you solve your corrosion problems with the most complete available line of corrosion proof materials of construction in the country.

Atlas provides a complete corrosion service from on-the-spot technical advice through engineering design to complete construction facilities to carry the job from beginning to end.

- CEMENTS
- COATINGS
- LININGS
- RIGID PLASTICS

ATLAS MINERAL
PRODUCTS COMPANY
MERTZTOWN, PENNSYLVANIA

Write for Bulletin CC#3 giving informative data on the complete Atlas line.

D. E. MOAT
Asst. Director of Marketing
Leeds & Northrup Co., Philadelphia

of raw materials and fabrication processing prior to heat treatment.

Hot quenching is assuming greater importance by providing improved technical control and better endurance life on highly stressed parts. Mechanized salt baths serve well in many applications.

Induction hardening will continue to play an important part in the economics of heat treating and the selection of materials, since automatic sequence and inline production are valuable features of this process.

Much progress is being made in continuous control of carburizing in hardening atmospheres. Carburizing or clean hardening atmospheres now may be held continuously to predetermined values. Adequate control of details in the hardening process will pay off through the reduction or elimination of posthardening testing and rejection losses.

Mr. Moat . . .

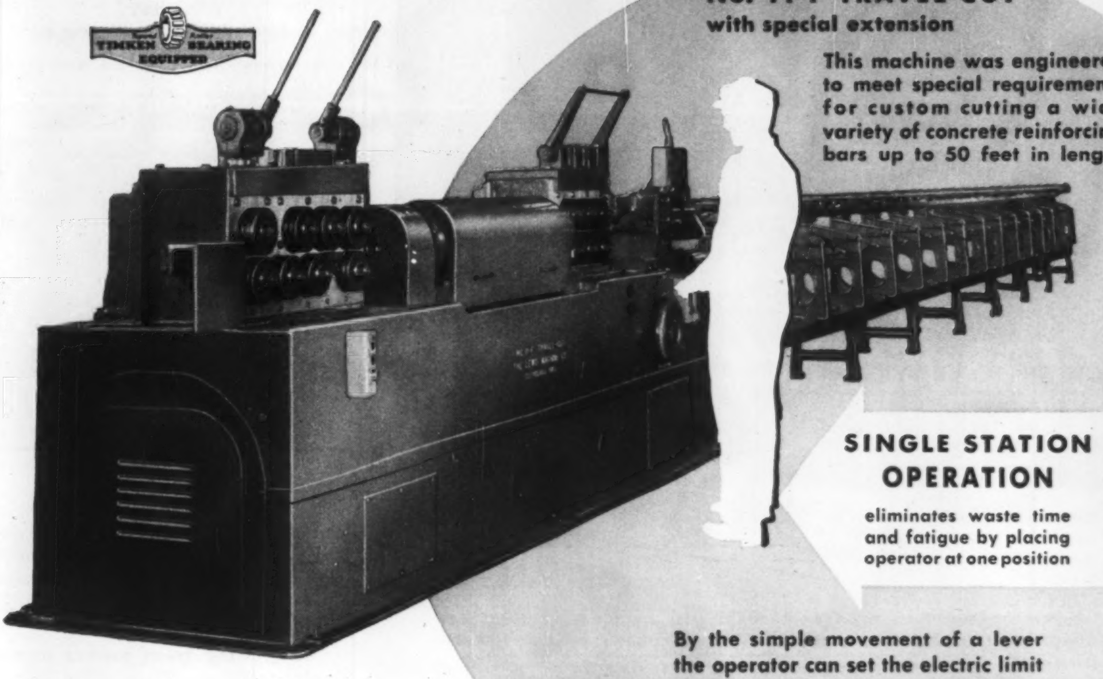
The quality of furnace atmospheres is being accurately measured on more and more furnaces, as well as on endothermic and exothermic generators. New, infrared-type, gas-analysis equipment is used. CO, CO_2 or CH_4 can be measured with ranges as low as 0 to 0.5 per cent, full scale, with a sensitivity of 0.005 per cent.

Field installations have demonstrated that quality and carbon level of furnace atmospheres can be maintained at close levels, either on continuous or batch-type furnaces. Practical for use by regular furnace op-

LEWIS

Machines can solve any wire straightening or cutting problems

Tapered Roller TIMKEN BEARING EQUIPPED



No. 11-F TRAVEL-CUT
with special extension

This machine was engineered to meet special requirements for custom cutting a wide variety of concrete reinforcing bars up to 50 feet in length

SINGLE STATION OPERATION

eliminates waste time and fatigue by placing operator at one position

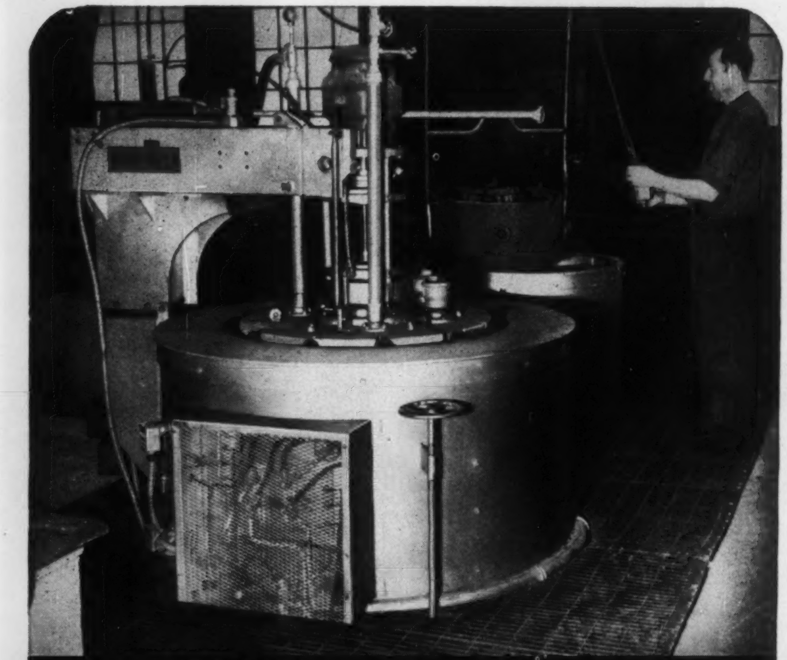
By the simple movement of a lever the operator can set the electric limit switch to cut any desired length from 6 to 50 feet. A dial graduated in feet and inches tells him the exact length the machine will cut. A preset counting device stops the machine when the proper number of pieces is cut.

Any predetermined number of pieces may be cut with this equipment to any predetermined length without the operator moving from his regular position at the machine.

There is a Lewis Machine design to straighten and cut all materials and shapes in wire and or bar stock from .012″ to ¾″ diameter at a wide range of speeds. If you have a wire straightening and cutting problem, or special requirements for a job, ask us for information and suggestions about how Lewis Machines can increase your production, control your quality and greatly reduce your costs.

New illustrated brochure available on request.

THE LEWIS MACHINE COMPANY
3441 East 76th Street • Cleveland 27, Ohio, U. S. A.



CARBURIZING TIME CUT 4 HOURS with a HEVI DUTY FURNACE

Electrol Inc., manufacturers of hydraulic devices, carburizes landing gear orifice tubes in 3 hours instead of 7 hours formerly required by the pack method.

Edgar B. Roesch, Factory Manager, says, "With this Hevi Duty Retort Furnace, we can produce a more uniform case faster because —

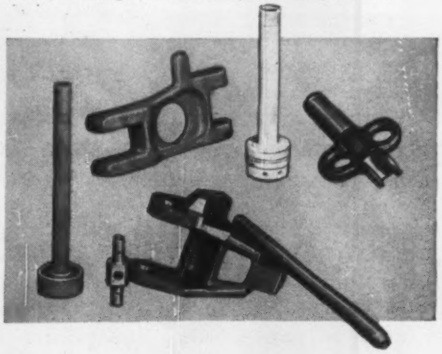
Forced Circulation assures even case depth throughout the densest loads.

Zone Temperature Control helps bring the load up to temperature more quickly and evenly.

Positive Pressure inside the retort has simplified the obtaining of exact carbon concentrations on the surface of the work and to specified depths."

The carburizing atmosphere is supplied from a Hevi Duty Endothermic Generator to which natural gas is added.

This atmosphere protects the work from scaling which results in a further saving of 50% in surface finishing time.



Write for Bulletin HD-646-R and more information about how the Hevi Duty Retort Furnace is used for carburizing, hardening, nitriding, and bright annealing.

HEVI DUTY ELECTRIC COMPANY
MILWAUKEE 1, WISCONSIN
Heat Treating Furnaces... Electric Exclusively
Dry Type Transformers *Constant Current Regulators*

F. O. HESS
President, Selas Corp. of America
Philadelphia

A. F. HOLDEN
President, A. F. Holden Co.
Detroit

erators, the equipment can be calibrated at any time, usually once every six to eight weeks, and requires maintenance on the average of only once a year.

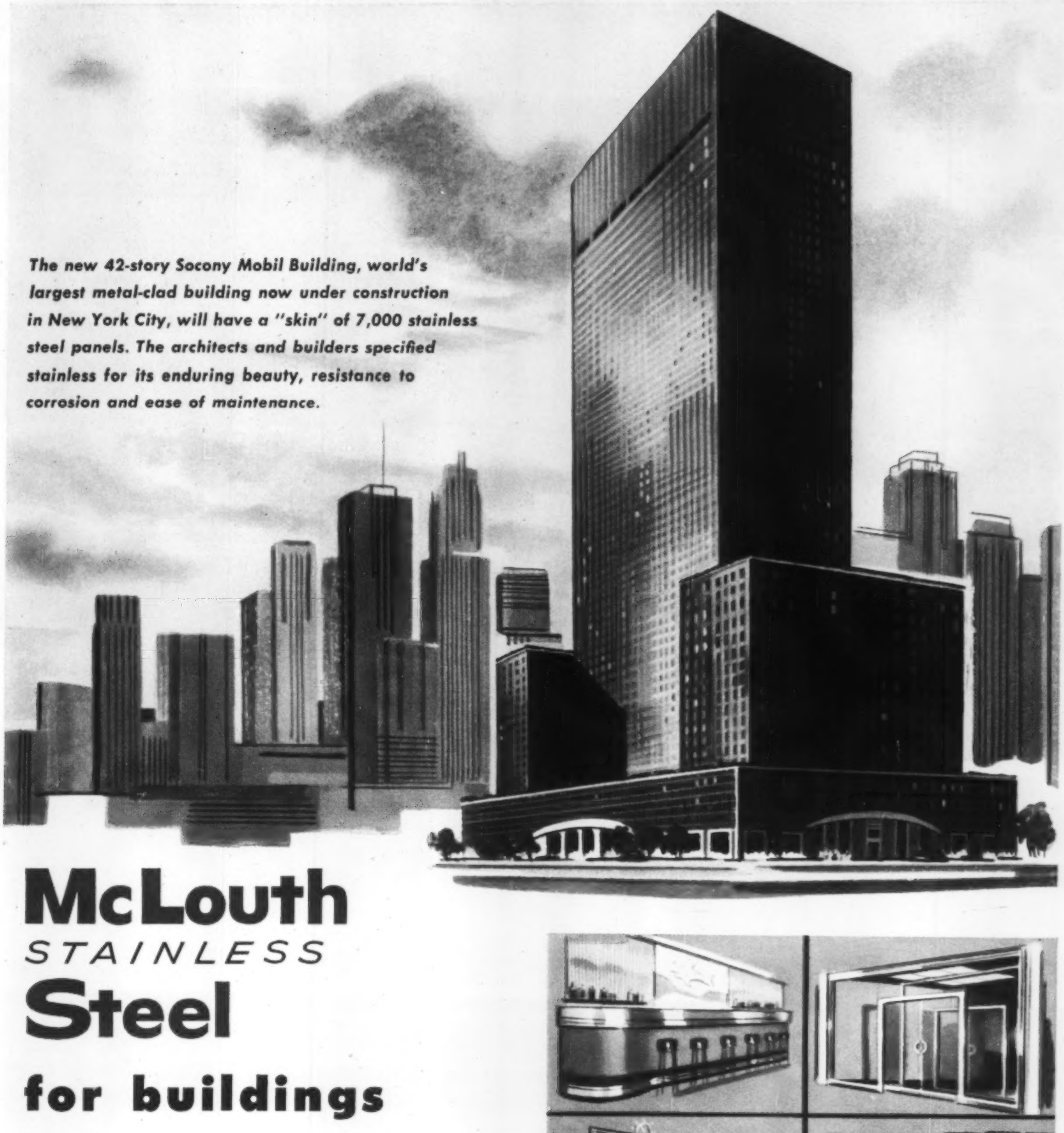
The growing trend toward higher quality instrumentation in all metalworking processes has resulted in a sharp upgrading of temperature control equipment. This has created a demand for more compact potentiometer instruments with interchangeable components.

Mr. Hess . . .

Fast heating will play an increasingly important role in helping modern industry keep pace with today's high-speed requirements and exacting demands. In addition to the obvious increases in production rates, fast heating also opens the way to automatic, continuous processing of large sections.

In one heat processing installation, die blocks are heated to 1550°F for hardening four to five times faster than conventional methods permit. A 38,000-lb workload, for example, which is equivalent to a single block 16 in. thick x 36 in. high x 20 ft

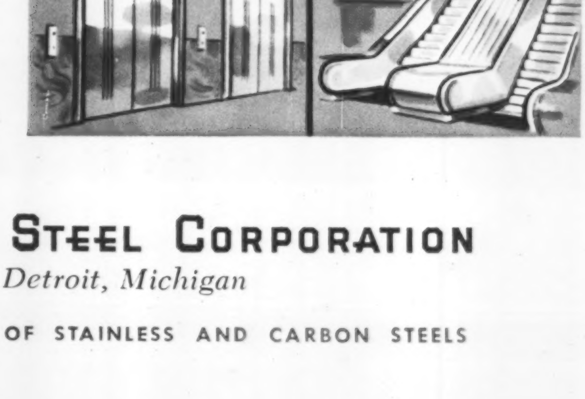
modern design specifies stainless steel



The new 42-story Socony Mobil Building, world's largest metal-clad building now under construction in New York City, will have a "skin" of 7,000 stainless steel panels. The architects and builders specified stainless for its enduring beauty, resistance to corrosion and ease of maintenance.

McLouth
STAINLESS
Steel

for buildings

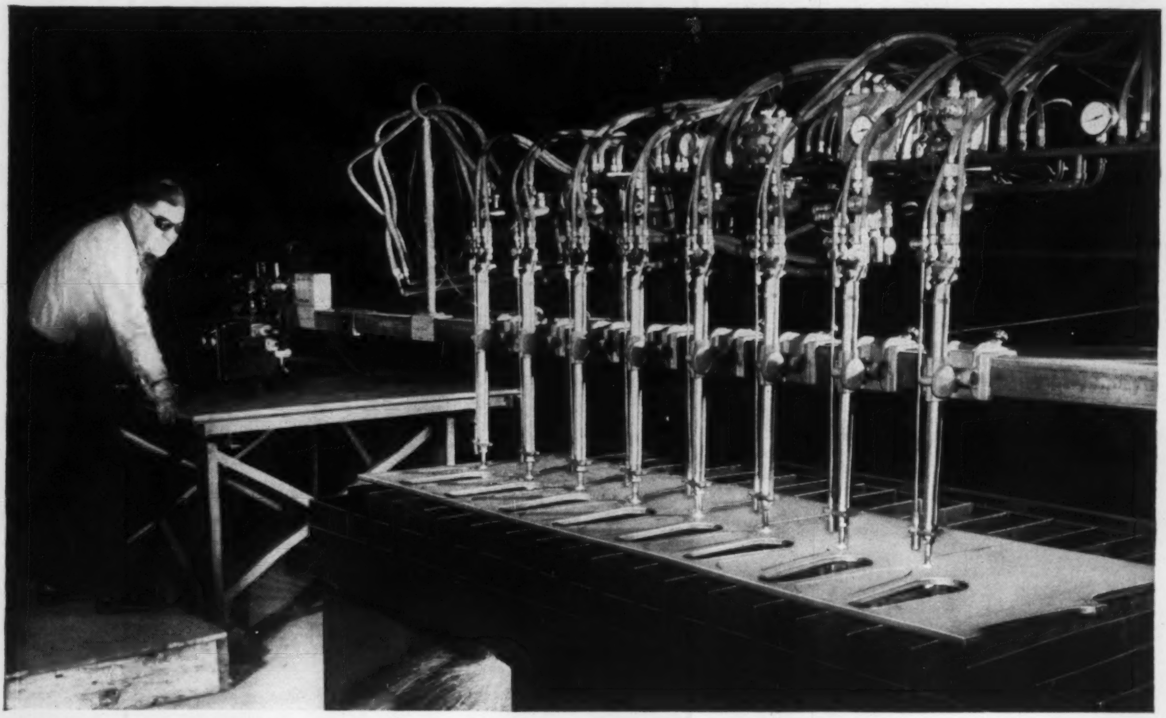


In fixtures, trim, curtain walls and hundreds of other applications you will profit by using McLouth Stainless Steel.

For the product you make today and the product you plan for tomorrow specify McLouth high quality sheet and strip Stainless Steel.

McLOUTH STEEL CORPORATION
Detroit, Michigan

MANUFACTURERS OF STAINLESS AND CARBON STEELS



Many 'hands' make light work...

...with unerring accuracy

Smoothly, the oxyacetylene torch severs and shapes steel plate with unerring accuracy. This universally accepted method of separating metal—machine gas cutting—has advanced in giant steps since torch cutting was introduced. It is impossible to enumerate the many benefits that modern cutting and welding practices have given the metalworking industry. Inevitably even greater services shall be rendered.

Today's complex production requirements demand machines of extensive range and extreme versatility. Which is the *right* Airco shape cutting machine for you?

- **Airco #50 Travograph.** Track-mounted for unlimited range, this unit shape cuts up to eight identical parts within a full 12′ circle. The cutting torches conform exactly to the movement of an electronic, manual, magnetic, or spindle tracer.
- **Airco #6B Oxygraph.** (Illustrated) This stationary machine shape cuts within a 29′-9½″ x 6′-4½″ area. It operates on the pantograph principle (pioneered by Airco) mounting up to 8 torches.
- **Airco #48 Duograph.** Designed for the smaller metal fabricating shop, the Duograph has a rectangular cutting range of 4′ by any length.

Other Airco machine gas cutting units include the Monograph, Radiagraph, and new Camograph. Details on each are fully covered in individual bulletins. Write today.

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Air Reduction Canada Limited

Products of the divisions of Air Reduction Company, Incorporated, include: **AIRCO** — industrial gases, welding and cutting equipment, and acetylenic chemicals • **PURECO** — carbon dioxide, liquid-solid ("DRY-ICE") • **OHIO** — medical gases and hospital equipment • **NATIONAL CARBIDE** — pipeline acetylene and calcium carbide • **COLTON** — polyvinyl acetates, alcohols, and other synthetic resins.

W. A. DARRAH
President, Continental Industrial Engineers Inc., Chicago

long, can be heated in only 3 to 4 hours, compared with previous 20-to-30-hour cycles. The entire heat cycle is completely automatic.

An estimated 16 million lb of die blocks were produced in 1955 with this high-speed, gas-fired heating method, demonstrating that fast heating is practical and safe.

Mr. Holden . . .

The trend toward marquenching or austempering and the elimination of oil quenching is continuing. Parts have longer life and harder cases and show less distortion and size change.

Another development is in the field of isothermal annealing of various alloys for short-cycle applications. It improves physicals and machining properties.

More heat treaters are using hot salt for cleaning scale from castings, particularly when sand may be entrapped in blind holes.

Mr. Darrah . . .

Putting metallic titanium into production has emphasized the importance of the absorption of minute traces of dissolved gases or alloying elements during heat treatment. Hot titanium is much more sensitive than many other metals. As a result, we are witnessing the commercial beginning of the age of vacuum heat treating.

A further development which promises to influence heat treating and

ROLOCK
FABRICATED ALLOYS
HEAT AND CORROSION RESISTANT

2700-lb.
Job-Engineered Muffle
demonstrates value
of ROLOCK methods

This completely fabricated-welded annealing muffle is 13′10″ long, 14″ high inside, and 48″ wide. The material is 5/16″ Inconel. It is used for continuous annealing of copper and brass tubes at 1600°F. in a Rockwell muffle furnace.

The use of homogeneous wrought alloy in an integrated pattern of ribs and corrugations permits relatively thin metal sections for rapid heat recovery and close temperature control with structural strength at tempertaure.

Equipment engineered to the job in close cooperation with the customer and fabricated to Rolock's high quality standards is setting new standards of performance in the heat treating field.

This is just one example from our current production. If you use muffles, furnace retorts, furnace trays or other heat and/or corrosion-resistant equipment, you should know about the services Rolock offers. Write now for our NEW Catalog No. G-10, most comprehensive publication of its kind available.

SALES AND SERVICE REPRESENTATIVES FROM COAST TO COAST

ROLOCK INC., 1262 KINGS HIGHWAY, FAIRFIELD, CONN.

JOB-ENGINEERED for better work
Easier Operation, Lower Cost

8RL55

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TODAY
TOMORROW

CONTINENTAL

Serves Industry Everywhere

COMPLETE PLANTS designed, constructed, and equipped as an integrated unit for efficient and economical production.

CONTINENTAL

Tomorrow's Designs Today

SPECIAL EQUIPMENT industrial furnaces, ovens, gas generators, and dryers—all fuels—field or shop erected.

PRODUCTION LINES tailored to individual needs requiring minimum labor for maximum output.

CONTINENTAL

30 Years' Extensive Experience

insures prompt service in planning and production by experienced engineers who know industry's problems. Our numerous sales and service centers keep in constant touch throughout all phases of the work.

Write for Booklet No. 135

This booklet covers the scope of CONTINENTAL Service. It is well illustrated with views of CONTINENTAL installations with descriptions of the equipment and the processes performed.

CONTINENTAL

5242

CONTINENTAL INDUSTRIAL ENGINEERS, INC.

176 W. Adams Street, Chicago 3, Illinois

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H. B. OSBORN JR.
Technical Director, Tocco Div.
Ohio Crankshaft Co., Cleveland

metallurgical progress is the development of large, single metallic crystals by selective heating in a vacuum. Their strength is many times that of commercial metals, and offer promise of producing metals with tensile strengths approaching theoretical values.

Vacuum heat treating processes have eliminated surface oxidation, while developments in controlled atmospheres open new fields of surface modification for tomorrow.

Mr. Osborn . . .

Induction heat treating equipment will reflect the continuing interest in automatic processing techniques. More and more of our customers are demanding, and we are supplying, automated machines that handle hundreds or thousands of parts an hour.

Consider the machines that automatically feed, transfer and discharge camshafts at the rate of 600 an hour, each hardened on all 12 cams—and bearings, too, if specified. Some do a complete job of machining and heat treating on the same unit.

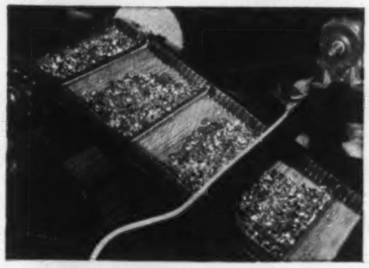
Much publicized has been the use of 60 cycles for heating metals for forging. However, do not overlook the tremendous possibilities of using 60-cycle induction heating for stress relieving. Even though the efficiency may be low for small parts, the heat is uniform and the equipment is always smaller and often cheaper than a conventional furnace.

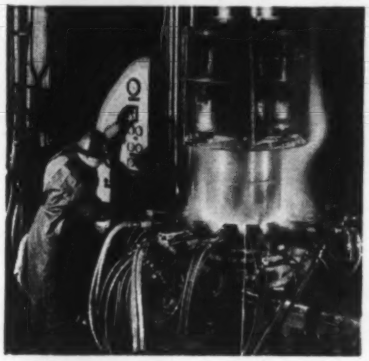
You need MORE than these to Heat Treat Metals!

The science of heat treating has become of vital importance to many manufacturing operations. Without the radical improvements of the properties and characteristics achieved in metals and alloys by heat treating, many of the nation's most important products could not be made.

To perform the appropriate type of heat treatment, such as annealing, normalizing, quenching, tempering, carburizing, controlled atmosphere hardening, stress relieving and others requires specialized, intricate, and expensive equipment such as is illustrated here.

But *more* than such equipment is needed. The most modern and highly specialized equipment is useless without the correct combination of operational skill and technical experience that has been developed over years of practical operating practice. Equipment and materials are important, but the *essential* factor in heat treating operations of all kinds is the human touch and the practiced hand.

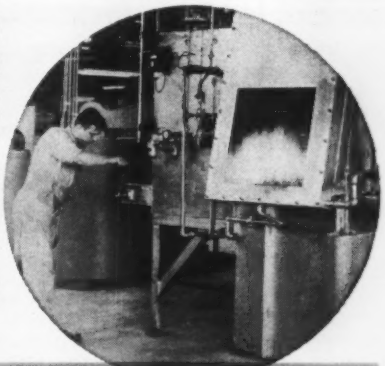




The members of the Metal Treating Institute listed here are the recognized leaders of the commercial heat treating industry. They are specialists possessing the equipment, the technical skill, the years of experience, and the personnel with which to solve your heat treating problems all under one roof.

When you need complete heat treating services or want consultation concerning heat treating or engineering or design problems, write any of the companies listed. All inquiries will receive prompt attention.

WRITE FOR A COPY OF A BOOKLET "A REVIEW OF SALT BATH CARBURIZING".



THERE'S A HEAT TREATING SPECIALIST NEAR YOUR PLANT

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METAL TREATING INSTITUTE

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Allied Metal Treating Corp.
Kenosha; Manitowoc; Racine, Wisconsin
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The Dayton Forging & Heat Treating Co.
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New England Metallurgical Corp.
South Boston 27, Massachusetts
Paulo Products Company
St. Louis 10, Missouri
Pittsburgh Commercial Heat Treating Co.
Pittsburgh 1, Pennsylvania
The Queen City Steel Treating Co.
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Syracuse, New York
Winton Heat Treating Company
Cleveland 16, Ohio

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Supervisor, Nuclear Physics
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Chicago

C. G. McCLURE
Application Engineer
Sperry Products Inc., Danbury, Conn.

W. C. HITT
Douglas Aircraft Co. Inc.
President, Society for
Nondestructive Testing

INSPECTION AND TESTING

FORUM ON TECHNICAL PROGRESS

Ultrasonic testing grows in all directions . . . higher resolution crystals are coming . . . microhardness testing moves into the production line . . . photofluoroscopy and stroboradiography widen the scope of x-ray inspection . . .

Mr. Wenk . . .

New materials and new manufacturing processes are leading to new nondestructive testing methods. The past year saw many developments in equipment.

The immediate future will see increased use of nondestructive tests as sensing elements for automation. Signals generated by nondestructive tests can be used readily to supply information for automatic control of process equipment. Improvements in handling mechanisms and electronic circuitry have made it practical to use the signals for control.

TV will rapidly make the transition from the living room to the inspection bench. An imposing list of applications already has been reported, and many more are being tried. Closed-loop TV used with image amplifiers will increase the use of industrial fluoroscopy in the near future, with resulting economies in manufacturing and inspection costs.

Mr. Reiffel . . .

Use of electronic treatment of x-ray images continues to increase. Fundamental improvements are being made in solid state image intensifiers. Ultimately, they will show up as production control and inspection devices.

One of the most promising developments in nondestructive testing is the use of nondispersive energy proportional detectors, such as the newer high resolution counters. They are many times more sensitive than detection systems using crystal diffraction for the analysis of x-ray beams.

The counters can discriminate between fluorescent x-rays from most of the elements and can be used for chemical analysis, coating and plating thickness control, etc. Their high sensitivity and mechanical simplicity should combine to permit portable x-ray analysis units adaptable to many inspection and testing procedures.

Mr. Mc Clure . . .

The future of ultrasonic testing will lie in diverse areas. The human eye, as well as a huge hydraulic press column, may be probed with the same instrument.

The usual procedure is to introduce the testing beam into the top surface of a part. It has recently been proved practical to inspect parts by introducing the beam from the inside, for example, through the surface of a bore. Both contact and immersed methods have been used in this way. As many as five search units (all operating simultaneously) have been used to locate flaws in the test piece.

Equipment providing automatic interpretation of the indications has been developed. As the inspection is made under controlled conditions, benefits other than merely locating discontinuities are to be expected. Steel tubing may be inspected continuously as it is being welded for soundness of weld, and the proper adjustment of the welding machine may be monitored.

Mr. Hitt . . .

Major aluminum producers and forging plants are installing the best of ultrasonic equipment for end product quality control. The trend is gratifying to airframe engineers and quality control personnel.

Credit for the exchange of data among airframe manufacturers, aluminum suppliers, fabricators and instrument builders goes to the Airframe Committee of the Society for Nondestructive Testing. It was instrumental in compiling the first nationally recognized (ultrasonic testing) standard of acceptance for aluminum forgings and plate. Committees were appointed this fall to cover the aircraft engine parts and aircraft steel. They will parallel the

R. N. HAFMEISTER
Nondestructive Testing Section
Allis-Chalmers Mfg. Co.
Milwaukee

V. E. LYSAGHT
Div. Sales Mgr., Wilson Mechanical
Instrument Div., American Chain &
Cable Co. Inc., N. Y.

WALTER S. BAIRD
President, Baird Associates Inc.
Cambridge, Mass.

A. L. PACE
Industrial Sales, X-ray Dept.
General Electric Co., Milwaukee

Airframe Committee's work during the coming year.

We can look forward to some interesting developments. High resolving lithium sulphate crystals (capable of penetrating the thickest sections and still resolving near-surface discontinuities at the one frequency) will be available. Crystals capable of covering areas 6 in. and over at speeds faster than 2 fps are a reality. Recording devices and automation will be a part of this operation.

Mr. Hafmeister . . .

Consider testing that was hardly thought of ten years ago. We take routine radiographs of steel castings. Section thickness may be 20 in., exposure time, 20 minutes, sensitivity, 1.0 per cent. Use is being made of isotopes (such as cobalt-60, iridium-192 and cesium-137) for radiographic examination of production items.

The increased use of ultrasonic testing in the last ten years has been equally pronounced. Today, we test steel ingots prior to forging and determine their fitness. We test forgings, and base their acceptance or rejection on the ultrasonic test. As a result of the industry-wide interest in brittle failures in large forgings for high-speed turbines and generators, work on ultrasonic testing has been greatly intensified. Limits of acceptability have been tightened.

With ultrasonic testing, we are able to determine dimensions and quality of materials when only one test surface is available. We also are using the method to determine quality after a forging or casting has been in service—without the necessity of a complete tear down or destructive-type examination.

Mr. Lysaght . . .

Automatic hardness testing, testing of large irregular parts and microhardness testing promise to play increasingly important roles in 1956. The Rockwell test may now be done on automatic machines, testing up to about 1000 pieces per hour. The machine is capable of selecting down to a 2-point spread in the Rockwell C scale.

For the Brinell test, up to about 800 pieces per hour may be tested by fully automatic machines. In both methods, the machine decides which pieces are of proper hardness and automatically classifies the work as too hard, within proper range or too soft.

The second trend is the testing of unusually large or irregularly shaped pieces, internal surfaces and even the hardness of gears on the pitch line. With competition, increases in the price of labor and material and the resulting need to eliminate unsatisfactory parts, the practice has spread to production testing.

The microhardness test has definitely moved into production testing for such work as watch parts, electroplated specimens, foil, thin and case-hardened material. Both the 136-degree diamond pyramid indenter (Vickers type) and the Knoop indenter are used.

Mr. Baird . . .

Expansion is forcing decentralization of quality control centers. Often plants cannot be built adjoining present ones; defense plans call for decentralization of industry. In the past, samples could be sent easily to a central laboratory for analysis. Now it seems not only wise but necessary to establish control labs in the decentralized plants.

To complicate matters further, plants are becoming more specialized. Present-day planning indicates that control points should be as near to the product being controlled as is realistically possible. Anticipating this trend, we have developed the Spectromet for quality control of metals on the furnace or foundry floor. This instrument was simplified. It can work in adverse surroundings and rapidly enough so that information can be made immediately available to the melter.

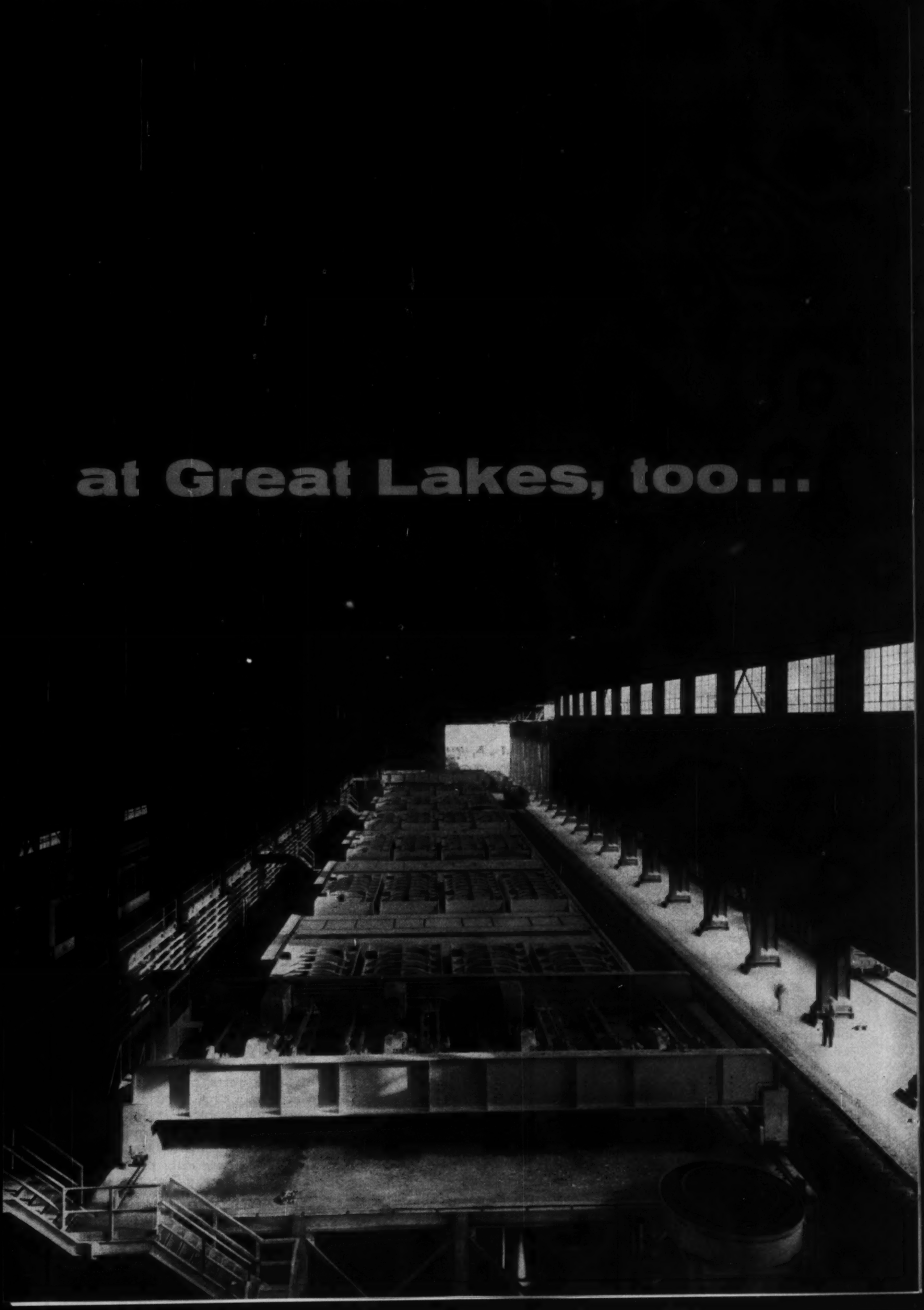
Such instruments will speed up production, increase quality and keep both capital and operating costs to a minimum. In many cases, it will be worth-while to have two or more instruments for special alloys rather than a single complex one to take care of a group of alloys.

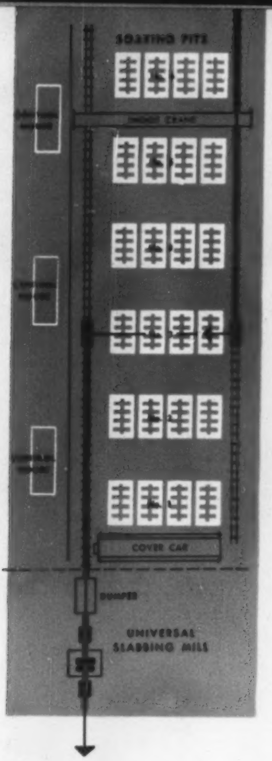
Mr. Pace . . .

Application of radiography to in-process inspection and subsequent quality control of operations is widening. Increased productivity in radiographic inspection is being obtained by shorter exposure times and increased utility of the x-ray equipment.

Panoramic radiographic techniques are using the complete 360-degree field of radiation with circumferential-type parts or small parts arranged in a circle. Photofluoroscopy, using an improved optical system, improved films and screens, is being applied to industrial x-ray inspection, reducing greatly both film and processing costs.

Stroboradiography is a technique of pulsing an x-ray beam to syn-


at Great Lakes, too...



high-production soaking pits

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At Great Lakes, six batteries, four 'Surface' pits in each, heat low carbon steel ingots for automotive and appliance steel. They also heat some low alloy steel ("NAX" grade). Capacity will be still further increased by the addition of 16 new 'Surface' pits now being built.

These one-way-fired pits include such 'Surface' features as the efficient jet pump recuperative system, and integrated temperature and combustion controls which are of the most modern design.
The performance of these pits, and many others, is among the reasons why steelmakers depend on 'Surface.'

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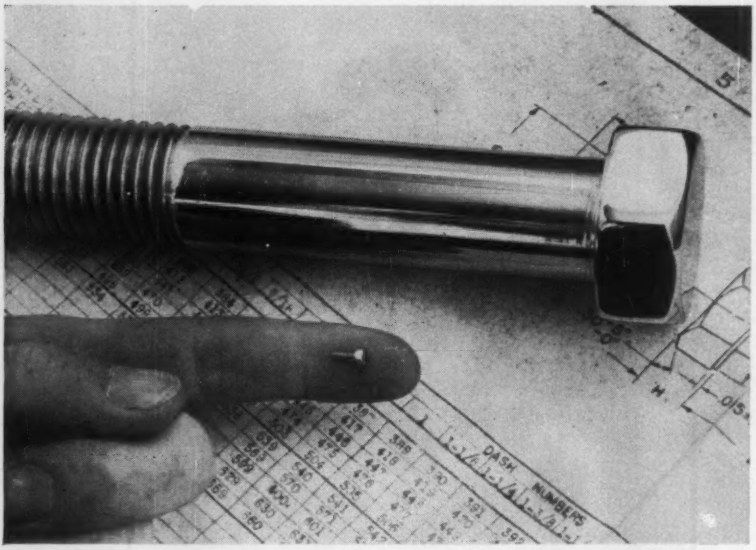

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Chief cause for Allmetal's ability to turn out fasteners — and have them ready for immediate shipment — is their spanking new plant in suburban New York (Garden City, Long Island). These added facilities — plus 26 years of specialization in tough alloys — give Allmetal the combination to supply stainless fasteners when needed. Stock list brochure available.

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LOUIS A. WELT
President, Steel City Testing
Machines Inc., Detroit

chronize with rotational machinery. Its application to the study of mechanisms in motion is becoming a valuable aid in designing greater life and dependability into products. The use of detectors has enlarged the field of x-ray inspection to include such things as control of rolling mills and inspection of height of fill of beer in cans.

Mr. Welt . . .

Testing of physical properties, such as is done on the machines we manufacture, is still being courted by automation—if the marriage already has not taken place in fact. Hardness testing seems to be particularly important to protect expensive tooling on automatic machining installations and to enable the life of the tooling to be accurately predicted. Other physical property tests are likewise important to reduce the number of unsatisfactory parts to a minimum. The mere existence of rejects seems to jam up automatic machinery in some cases.

Where testing is being done on a 100 per cent or production basis, we notice an ever increasing demand for completely automatic equipment to reduce manpower and speed up the testing operation.

Mr. Kiehle . . .

There is agreement on the value and necessity of inspecting castings, welds and concealed assemblies radiographically. But industry is demanding less expensive methods—giving

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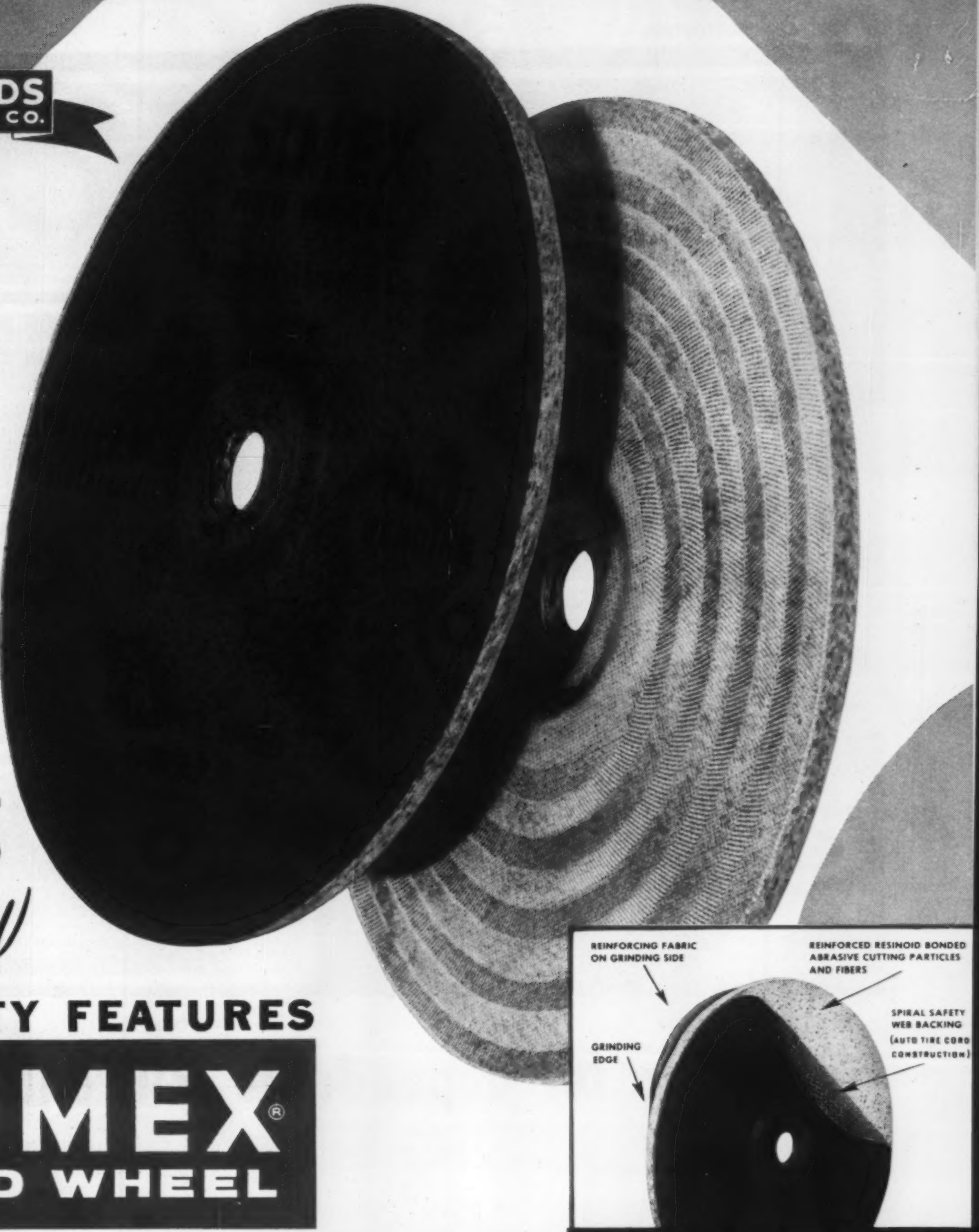
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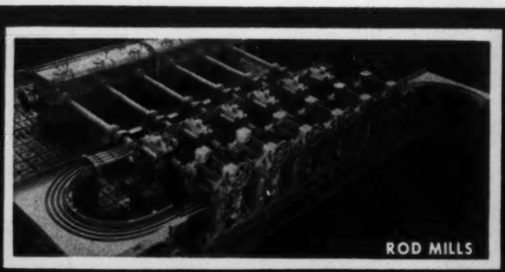

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impetus to the development of lighter and more portable equipment. Today, the maximum rating of portable x-ray machines ranges from 50 to 260 kilovolts; a mobile unit provides 1000 kilovolts. Gamma ray emitters are available in strengths up to multicuries.

Economy trends also stimulated developments in industrial fluoroscopic examination. Among recent advances are image amplifiers to brighten fluoroscopic images and closed-circuit TV links for remote viewing. The sensitivity of this method has been greatly improved. Its operational economy may make x-ray examination available to many industries not using it.

Cost cutting also is going on in labor and exposure procedure. An example in the pipeline industry: By utilizing a 360-degree cone of radiation and long strips of x-ray film in light-tight exposure holders, a complete circumferential weld can be radiographed in a single exposure.

Mr. Lonsdale . . .

Eddy current methods are being used extensively in the U. S. They were applied to relatively few products, and chiefly in Europe at that. The amazing variety of applications includes the detection of cracks, measurement of the thickness of metal sheets and foil, measurement of plating thickness, sorting of bar stock according to alloy or temper and the determination of the diameter of rods and wires.

Electronic image intensifiers are coming into use. These can be coupled with closed-circuit television to permit viewing of a radiographic image remote from the x-ray source.

The trend to portable equipment is continuing. Portable x-ray units coming on the market each offer some improvement, such as lighter weight, increased power or a choice of narrow or full-circle x-ray beams.

Mr. Reider . . .

Process control systems must be considered as an integrated whole, including equipment and procedures for performing five basic functions: Measuring, controlling, monitoring, recording and classifying.

Noncontact radiation gages and associated equipment are in use in process control systems. They per-

WILLIAM D. KIEHLE
X-ray Division, Eastman Kodak Co., Rochester, N. Y.

W. K. LONSDALE
Chief, Industrial X-ray Dept.
James H. Herron Co., Cleveland

J. E. REIDER
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Industrial Nucleonics Corp.
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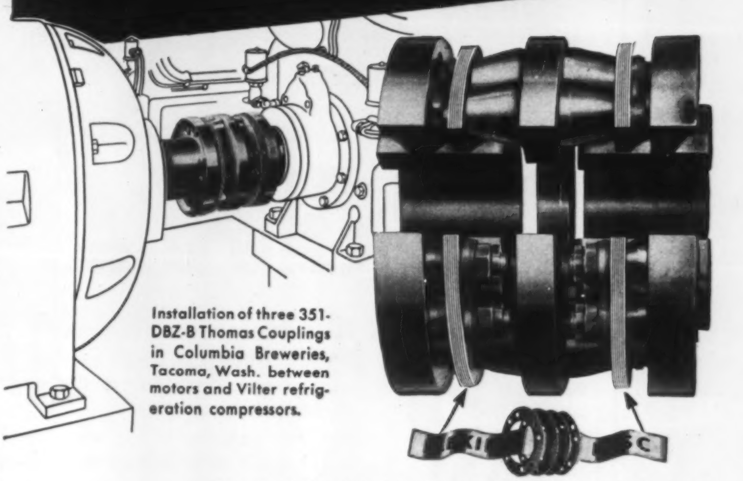

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Patented Flexible Disc Rings of special steel transmit the power and provide for parallel and angular misalignment as well as free end float.

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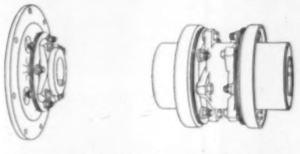
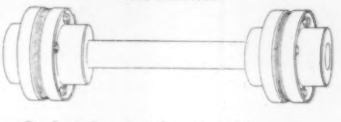
FACTS	EXPLANATION
NO MAINTENANCE	Requires No Attention. Visual Inspection While Operating.
NO LUBRICATION	No Wearing Parts. Freedom from Shut-downs.
NO BACKLASH	No Loose Parts. All Parts Solidly Bolted.
CAN NOT "CREATE" THRUST	Free End Float under Load and Misalignment. No Rubbing Action to cause Axial Movement.
PERMANENT TORSIONAL CHARACTERISTICS	Drives Like a Solid Coupling. Elastic Constant Does Not Change. Original Balance is Maintained.



Thomas Couplings are made for a wide range of speeds, horsepower and shaft sizes and can be assembled or disassembled without disturbing the connected machines, except in rare instances.



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Director, Technical Sales
High Voltage Engineering Corp.,
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form some or all the five functions in processing cold-rolled strip, galvanized strip and electrolytic tin plate.

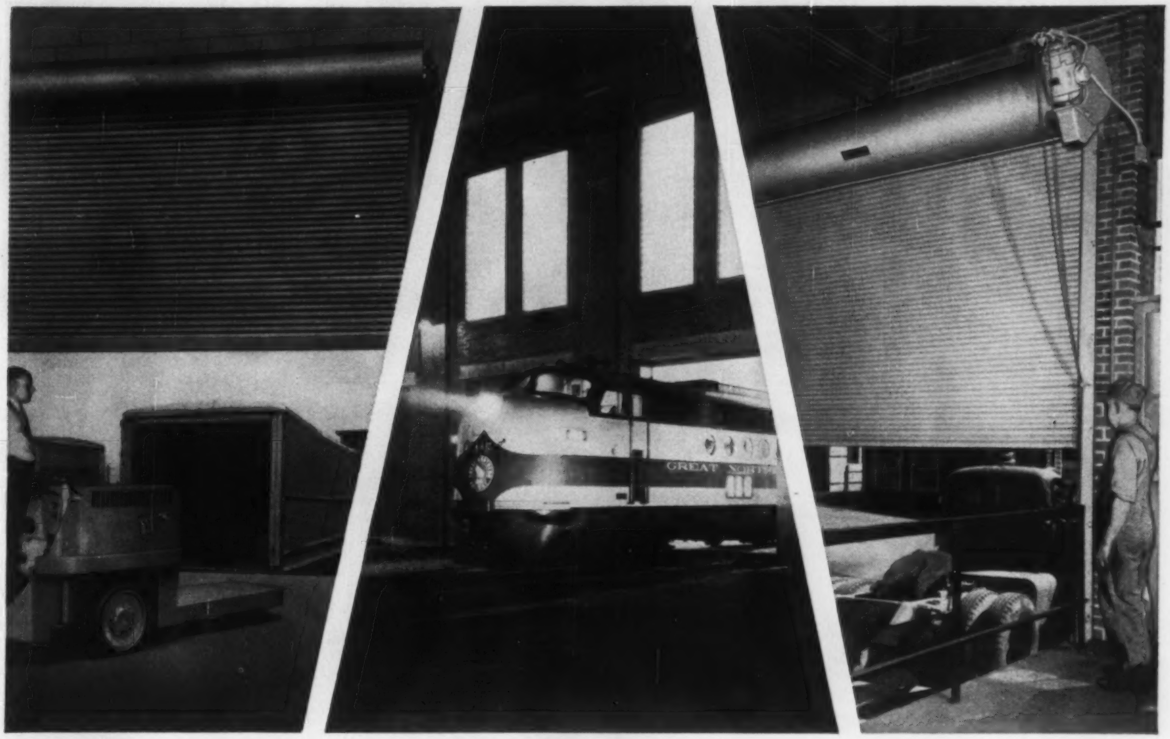
Data reduction readout equipment is available for automatically totalizing these measurements. Automatic classifying equipment is in use. It's actuated by noncontact gages measuring either a continuous strip ahead of a shear, or individual sheets on a conveyor. Finally, process control systems are being developed for compatible operation with industrial punch card systems.

Mr. Burrill . . .

In the last few months, we have observed a sharply increasing demand for intense supervoltage x-rays to provide high-quality radiographic inspection of critical components and assemblies—particularly from industries serving nuclear power and jet engine programs.

We have found that the versatility of the Van de Graaff makes it suitable for a number of unusual inspection problems—such as the production radiography of thick sections of light materials; highspeed examination of fabricated assemblies normally considered in the range of more conventional x-ray equipment, and cases in which the entirely self-contained supervoltage x-ray unit must be transportable for use in the field or inside large assemblies.

Industry is now aware, more than ever before, of the value of radiographic inspection, both as a money saver and as a key to higher quality products. These advantages become more impressive as metal thicknesses are increased to withstand the higher stresses encountered in today's radically new technologies.



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Mr. Hoge . . .

The control builder's role in automation is one of creative co-operation with the engineering staffs of machinery builders and end-use manufacturers. As often as not, the control builder produces the complete scheme which represents the combined thinking of its engineers and those of its customers. The control builder must continuously develop new devices that make possible new or modified schemes of automation.

Each year our company is developing circuits that use transistors, magnetic amplifiers and electronic tubes that increase the sensitivity and flexibility of conventional control schemes. To meet the more exacting demands of automation, our program includes advances like electromechanical devices that are more sensitive and can be adjusted in motion (such as multicontact limit switches).

Mr. Denison . . .

On the horizon for hydraulic equipment lie tremendous advantages to be gained from high pressure systems. Manufacturers of farm machinery and road building equipment want to raise operating pressure from 1000 to 2000 psi. They want to offer more power and speed of hydraulic operation.

Manufacturers of mobile air conditioners such as are used in food trucks and busses are looking for an efficient low-cost hydraulic transmission to eliminate the extra motors or gas engines used to power air conditioners.

The aircraft industries are using 3000-psi systems, but are doing work on 5000-psi ones. Other fields for high pressure hydraulics are mobile concrete mixers, mining machinery, oil field equipment and machine tools.

Next year will see increased use of high pressure hydraulics, long employed in the operation of presses, on all kinds of machine tools.

Mr. Van Nort . . .

Automatic quality control—utilizing feedback signals to control processing line variables—is part of the answer to greater steel production. An example can be found in a magnesium extruding process where the intermediate straightening operation was eliminated. An integrated electromechanical press puller drive system was applied so that as the metal was extruded from the press, a pull head clamped on to the extrusion and exerted a constant pull in the direction of extrusion. This ended the extrusion of irregularly curled shapes.

Pulling force was supplied by a variable-speed drive through a cable attached to the pull head and wound on a cable drum. The cable passed through a tensiometer stand which supplied the tension signal to the drive.

More extensive use of packaged drives for steel processing is indicated. An example is in a new stainless steel pickling line where Reliance V-S drives were tailored to fit application requirements. Special consideration had to be given to the drive system because of the special care needed to prevent marring or scratching of the stainless surface. Four compact control units housed the factory-wired, motor-generator sets and control panels that supplied power to the drive motors for each half of the two-strand line. The packaged feature brought about a saving in space, ease of installation and a reduction in installation cost.

Mr. Ross . . .

Direct-current drives are suited to continuous or automated production because of their inherent flexibility, and because they can be controlled or programmed by small feedback signals.

For increased flexibility of control, there is a trend away from the constant-potential, direct-current bus and toward the installation of a single motor-generator set for each direct-current motor. Ward-Leonard-type control of the individual

J. D. LEITCH
Vice President & Chief Engineer
Electric Controller Mfg. Co.
Cleveland

E. H. BROWNING
Manager, Industry Engineering Dept.
Westinghouse Electric Corp.
East Pittsburgh, Pa.

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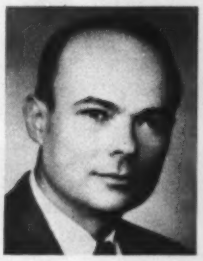
Chain Belt Co., Milwaukee


W. E. MILLER
Manager, Steel Mill Systems
Engineering General Electric Co.
Schenectady, N. Y.

direct-current generator field to adjust the speed of the single motor it powers allows a wide range of speed choices and motor-to-motor speed ratios, without restricting other design requirements. Packaged motor-generator sets, pre-engineered and pretested, are giving added impetus to this trend.

Emphasis in direct-current equipment design is on increased reliability of motors and generators to obviate expensive down time. Motor insulations are receiving concentrated attention. Higher motor speeds and wider speed ranges are also in store for direct-current equipment purchasers. Industry recently has adopted suggested new design standards to include lower inertia, better insulation, better matching of motor and generator ratings and provisions for upgrading motor enclosures.

Mr. Leitch . . .

The work of our armed forces on servomechanisms has given great impetus to the concept of feed-back control. While the feed-back principle is old, its application provides the ultimate in automation: Any deviation in the operation of a machine from that desired is detected as an error. The signal acts upon the control system to eliminate the error.

The development of digital computers is another field which has received considerable attention. Concepts that are old to mathematicians, such as the binary system of numbers and Boolean algebra, have found a new place in modern technology. Our newest business machines are founded on these concepts, and they are also becoming important in the control industry.

As might be expected, these advances in the control art have brought with them an increasing demand for qualified engineers and technicians. It is a demand which must be satisfied if the pace of automation is to be maintained. In our present economic atmosphere, the extent of our technological progress will be determined as much by this one factor as by any other.

Mr. Browning . . .

In this day of electrified industry, one can find but few instances in the making and processing of steel where electrical equipment is not responsible for providing the motive power. Continued progress is certain in drives for mills and processing lines, in the improvement of basic materials used in the construction of electrical equipment and in the extension of performance ratings in most every type of electrical apparatus.

Computers are being designed and applied as integral parts of control systems. Advantage is being taken of the plus features offered by card programming methods. Beause of the increased emphasis on product quality, automatic monitoring systems are being applied to rolling mills and process lines.

One such application is that of automatic gage control in the cold reduction of sheet and strip products. Signal indications of product thickness are obtained through use of radiation-type gages and mill-housing or mill-screw strain gages. These signals are supplied to regulating equipment to change mill speed, strip tension or screw-down settings to maintain desired conditions.

Mr. Welser . . .

The reliability, flexibility and easy adaptability of mechanical conveyors and drives have helped make "automation" feasible.

In a field such as packaging machinery, the handling of parts by mechanical conveyors and imparting varied motions to a multiplicity of mechanisms are not new. Many agricultural implements, such as grain combines, are old examples of what is called "automation" today.

The new term "automation" and its current publicity stem, to large extent, from present, intensive application of old principles and their expansion to many more fields of manufacturing.

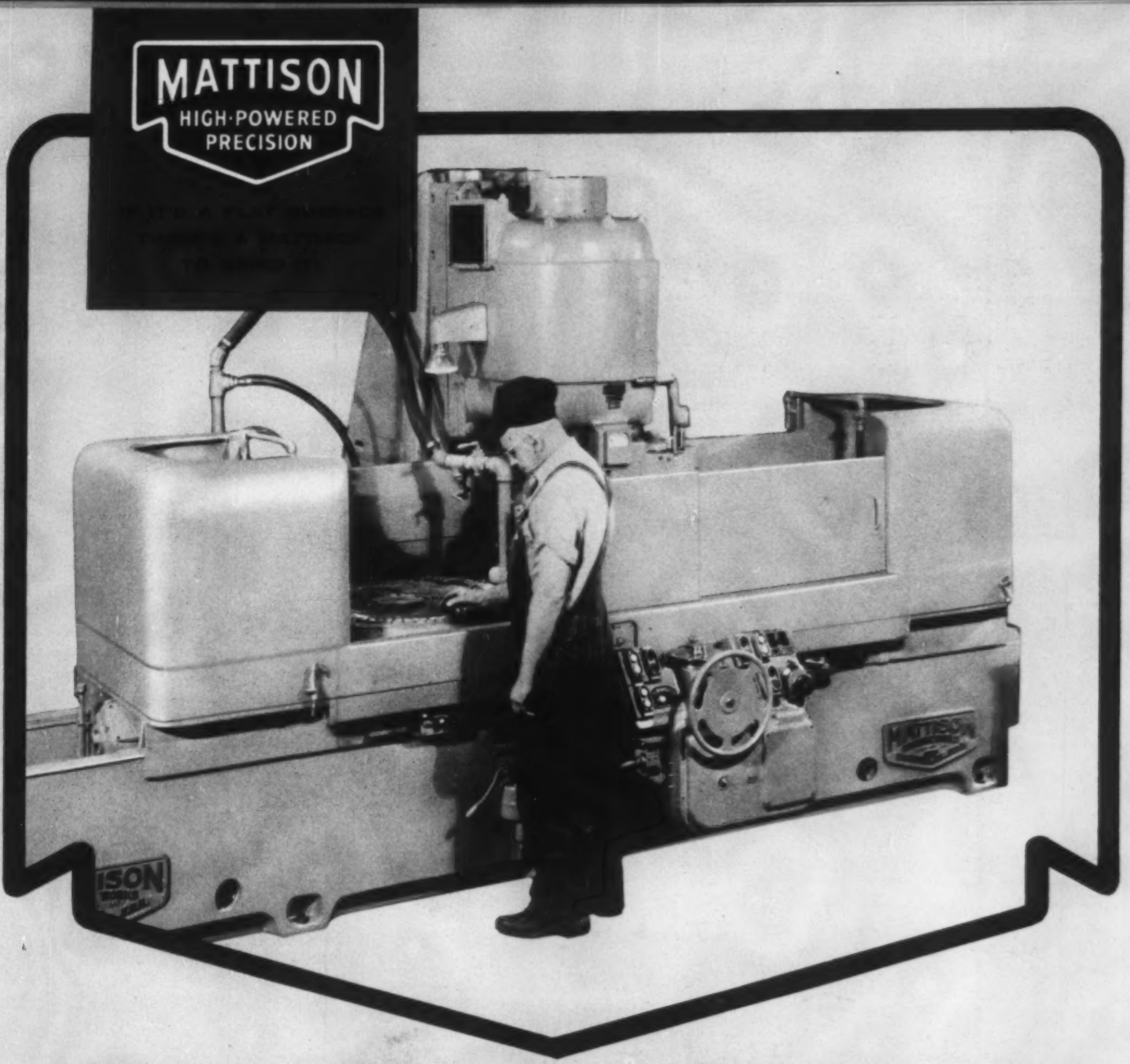
The ever-increasing demand for "automation" will spur further improvements in mechanical drives as new applications in more and more fields are devised.

Mr. Miller . . .

In 1955, drive systems for the metal industry became bigger, faster, more automatic and greater in number. The higher speeds, larger machinery and larger production required increased automation and greater precision in automatic process control.

For the first time in the U. S., a reversing hot mill is being powered by a rectifier drive. It is rated up to 500 kw, with peak ratings normal for blooming mill service. Magnetic amplifier regulating systems provide accurate control of rectifier voltage, phase retard for current zero switching of line contactors and deceleration and acceleration of the drive during reversals.

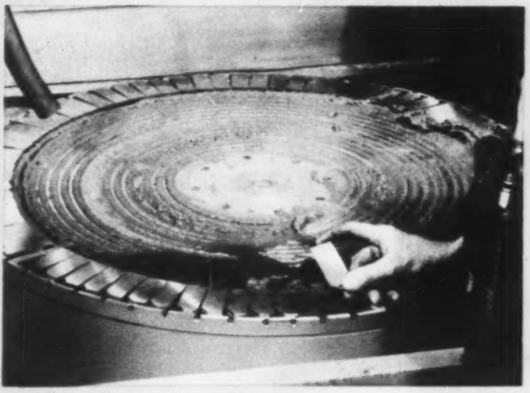
Electric auxiliary drives also are on the increase. Low-speed, direct-



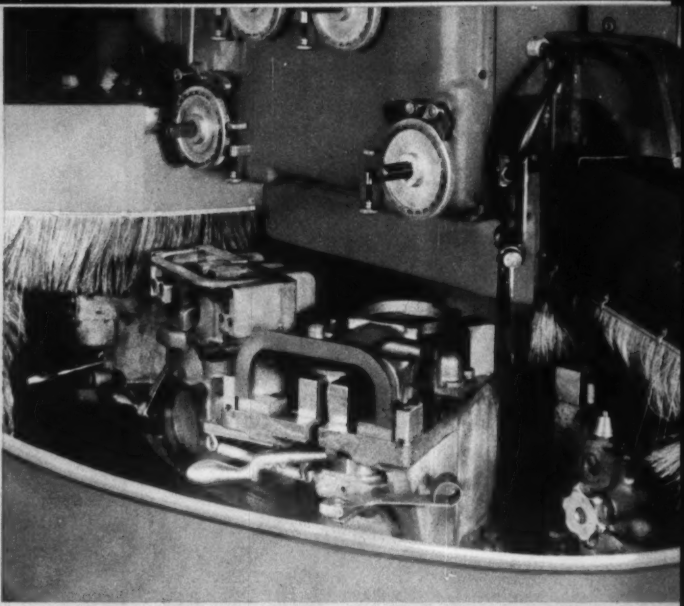
GRINDING METHODS

How Ingersoll expanded capacity by absorbing loading time into production cycle—Installation of new Mattison Duplex Rotary Surface Grinders enabled Ingersoll Milling Machine Company to achieve startling results in the grinding of Maxel steel shanks for carbide-tipped milling cutter blades. One important result of the use of the new machines was slashing rough grinding time in half. Another important benefit was the fact that one operator with a Mattison Duplex Grinder can now handle the work which required two operators and two standard grinders under the former production setup.

The Mattison Duplex Grinder can be considered two machines in one, because it is fitted with two rotary tables or chucks. Stopping the machine to load or unload parts is a thing of the past with this arrangement, because the operator loads one table while the other load is being ground. At Ingersoll, a single ring of blade shanks is placed around the periphery of the 30 in. diameter chuck and .050 in. of stock is removed.



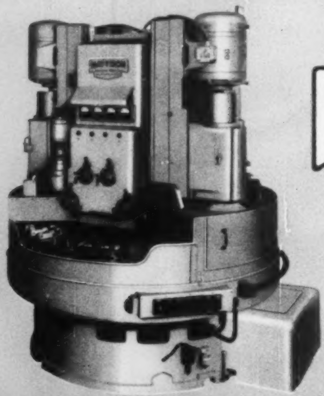
High horsepower, rigid construction, and the duplex tables have combined to make possible this remarkable saving in time and money.



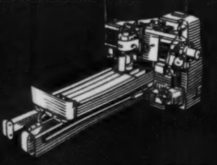
Solves difficult machining problem—production 80 pieces (240 surfaces) per hour

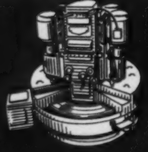
Here is an example of how grinding can replace other machining methods to do a better job at lower unit cost. These cylinder front covers are made with thin wall sections which tend to spring or buckle if they are finished on a milling machine.

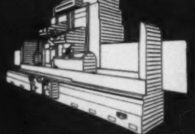
Grinding these workpieces on a Mattison No. 72 Four-Spindle Rotary Automatic Surface Grinder proved to be the perfect answer to the machining problem. Rough, semi-finish, and finish cuts are taken on the engine face, pan face, and water pump body face, with only a single pass through the machine. Each wheel of the machine is equipped with an automatic sizing device to compensate for wheel wear automatically and consistently grind within the required dimensional tolerances. This Mattison grinder is designed for high production rates and a wide range of work. It is especially well-suited to jobs requiring extreme accuracy and fine finish.

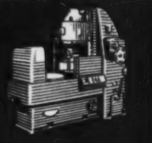


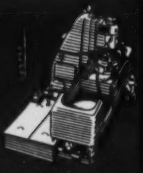
The No. 72 Rotary
Automatic Grinder
is designed for
continuous loading
and unloading of work.



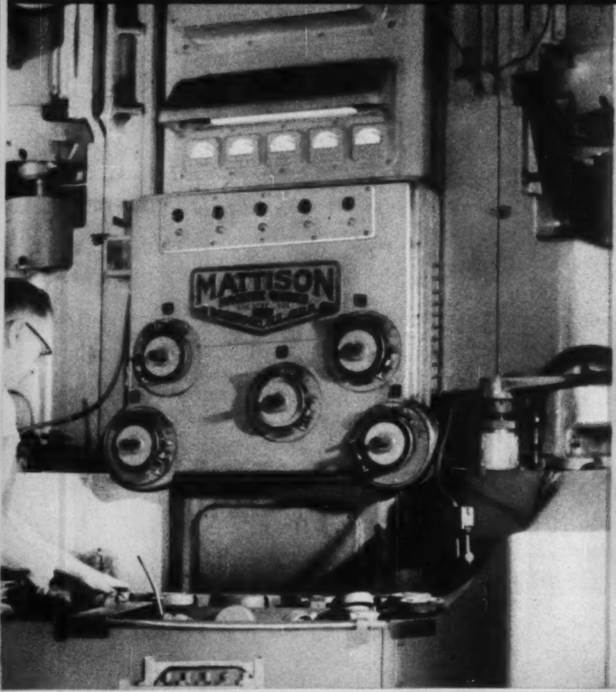








SELECT THE RIGHT GRINDER FOR YOUR JOB FROM MATTISON'S COMPLETE LINE OF



Rough and finish grind two sides of compressor heads at rate of 1200 every 8 hours

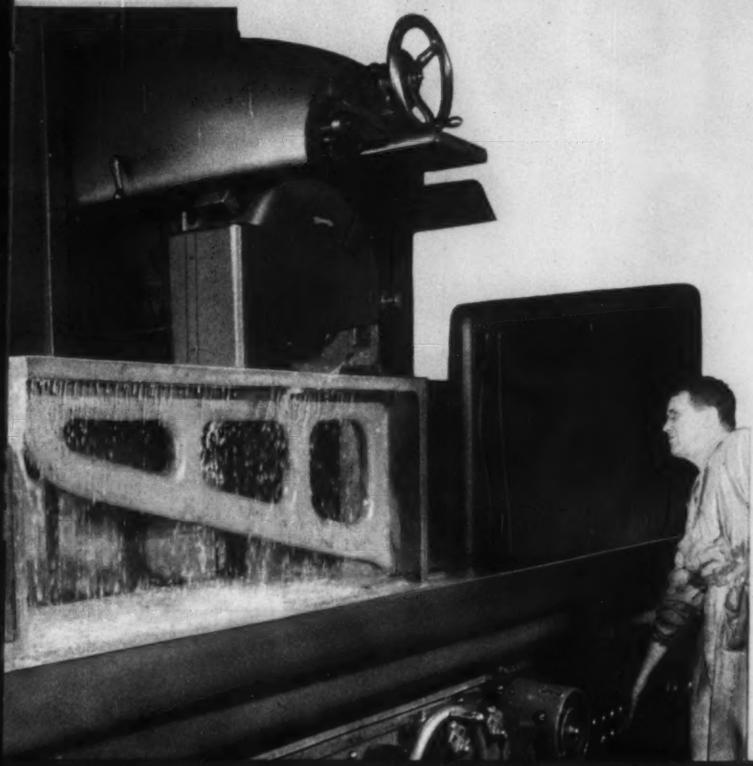
High production with extreme accuracy marks the daily output of a Mattison No. 100 Five-Spindle Rotary Automatic Surface Grinder. This machine is at work in the plant of one of the world's largest manufacturers of home refrigerators and freezers. Its job is finish grinding the faces (front and back) of two sizes of refrigerator compressor parts.

These cast iron parts are ground at the rate of 1200 pieces each per 8-hour shift, and held flat and parallel within .001 in.

Accurate, smooth operation speeds production of difficult-to-grind precision parts!

MATTISON
HIGH-POWERED PRECISION

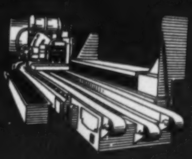
GRINDING METHODS

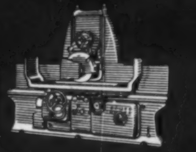


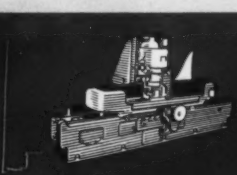
Smooth operation that permits accurate grinding of oddly shaped, difficult-to-hold pieceparts is one of the greatest advantages of the Mattison High-Powered Precision Surface Grinder, according to a Detroit manufacturer of surface plates, angles, and related products.

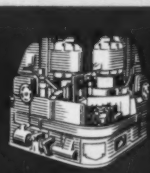
Because these products are destined for layout operations, they must be made to precise tolerances. Mattison Surface Grinders make it possible to maintain tolerances, cut setup time in half, and increase accuracy and production 50 per cent.

The part shown is a plane angle of Meehanite iron which must be ground to .0002 parallel in 60 in. removing .002 in. of stock on each pass. This piece is difficult to grind because it is high, narrow, and hard to hold on the table. The smooth operation of the Mattison grinder eliminates any possibility of vibration or tearing loose of the piece.









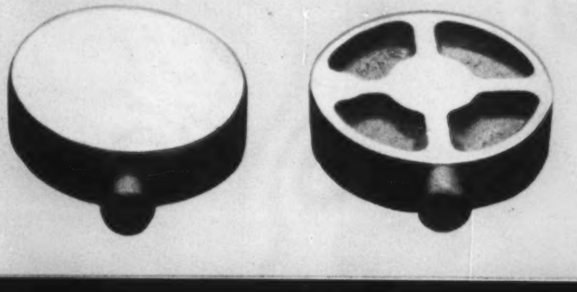
30 DIFFERENT MACHINES • SURFACE GRINDERS • FACE GRINDERS • DISC GRINDERS

This production rate compares to 300 pieces per 8-hour shift, maximum output when using single-spindle machines.

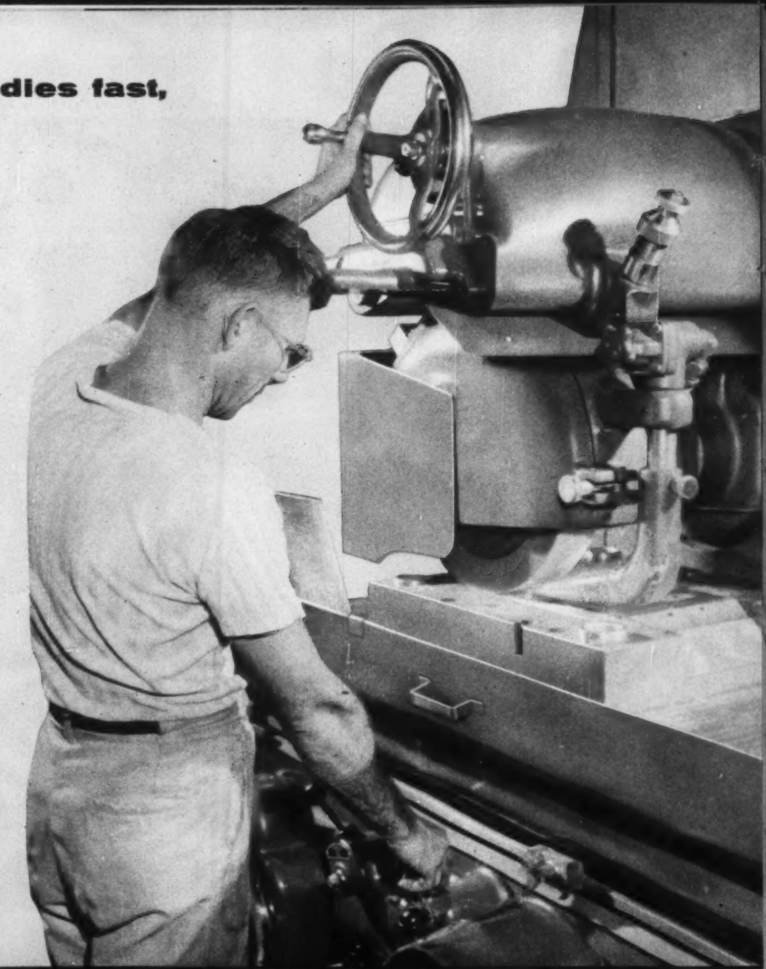
Each side of the compressor part is finished in one pass through the machine. Stock removal ranges from .025 in. by the first head to .005 in. by the fifth head.

High horsepower for a wide range of work is an outstanding characteristic of the No. 100 which has each of its five spindles driven by a 40 hp motor. Exceptionally rigid construction for year in, year out accuracy and minimum maintenance is another feature of this machine.

These cast iron refrigerator compressor parts are held flat and parallel within .001 in



Sharpens large lamination dies fast, within .0002 in. of parallel

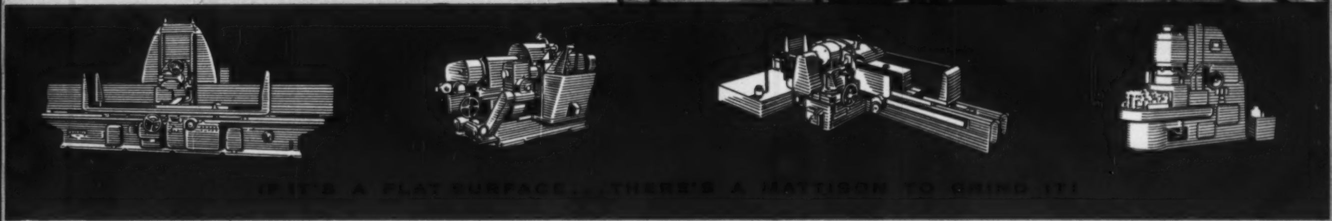


A large volume manufacturer of electric power and control transformers has been able to reduce die sharpening time as much as 37½ per cent with a new Mattison High-Powered Precision Surface Grinder. Parallelism is held within .0002 in. on these dies, an important factor in the finished accuracy of die cut laminations.

These dies present other problems because they must be ground on a taper and have shoulders on each side which cannot be touched. Every requirement of precision and performance has been met by the Mattison grinder to the complete satisfaction of the user. Accuracy is maintained within tenths, if the job requires it. An example of the increase in speed can be found in the case of one die which took four hours to sharpen on another machine. This is now finished in 2½ hours on the Mattison.

This machine is built with high horsepower, rigid construction, and ability to handle a wide range of work with extreme accuracy at high production rates.

This laminating die of Neor tool steel is sharpened in 37½ per cent less time on the Mattison.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Here is the latest information about progress in the field of high-powered precision surface grinding. It analyzes the part played by high horsepower and rigid construction in full utilization of today's grinding wheels and wheel bonds. It is the story of increased production, improved finishes, and reduced costs.

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MACHINE WORKS
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HIGH-POWERED
PRECISION
SURFACE
GRINDERS

MATTISON MACHINE WORKS
ROCKFORD, ILLINOIS

R. E. DAVIS
Chief Project Engineer
Oilgear Co., Milwaukee

drive, direct-current, mill motors power individual table rolls on large reversing hot mills used for slabbing and roughing. Line shafts and gear drives have been eliminated. The loss of a single motor or gear can no longer shut down the entire mill, and repairs or replacements can be made without shutdown.

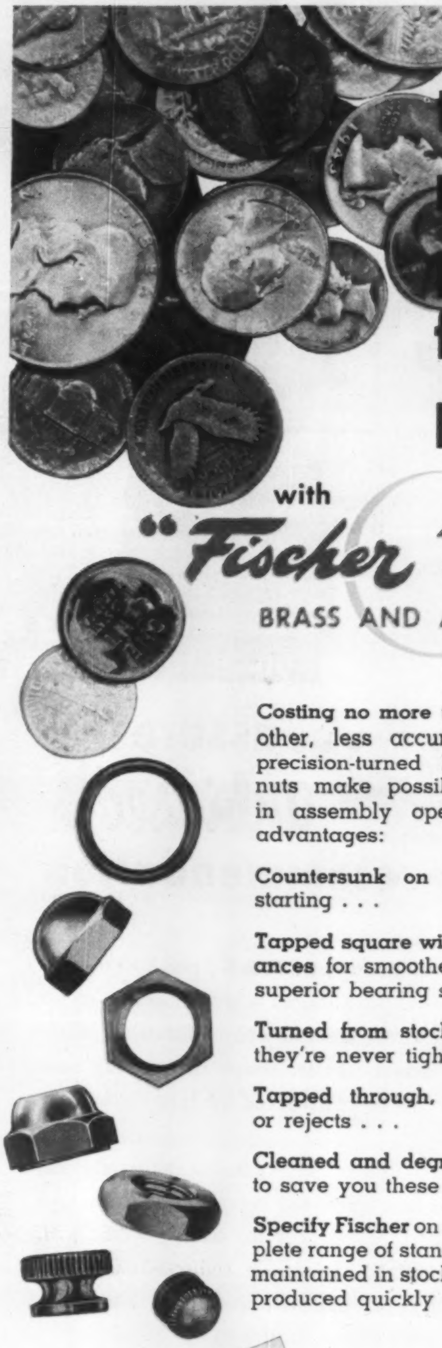
Automatic gage control systems are operating on high-speed, tandem, cold-reduction mills for tinplate stock. A typical installation in the Pittsburgh area utilizes two x-ray gages and transistor-magnetic amplifier regulating equipment.

Mr. Davis . . .

Control is the feature being emphasized on hydraulic drives. Process control drives and drives for automatic machinery require higher precision, greater speed of response and more versatile control elements.

Hydraulic drives hold a constant speed-load relation over a wide range of speeds. Drives giving good control over a 5000 to 1 speed range are available. They make use of precision hydraulic tachometers as speed measuring devices and can hold speeds constant within 0.1 per cent of full-load speed over a zero to full-load change. Hydraulic motors of the piston type can operate smoothly at speeds well under 1 rpm and at maximum speeds of 3000 rpm. This wide speed range, combined with the high precision available with the hydraulic tachometers feedback circuit, results in a drive which is exceedingly versatile.

The low inertia of hydraulic motors, compared with electric motors, is an important factor in the selec-



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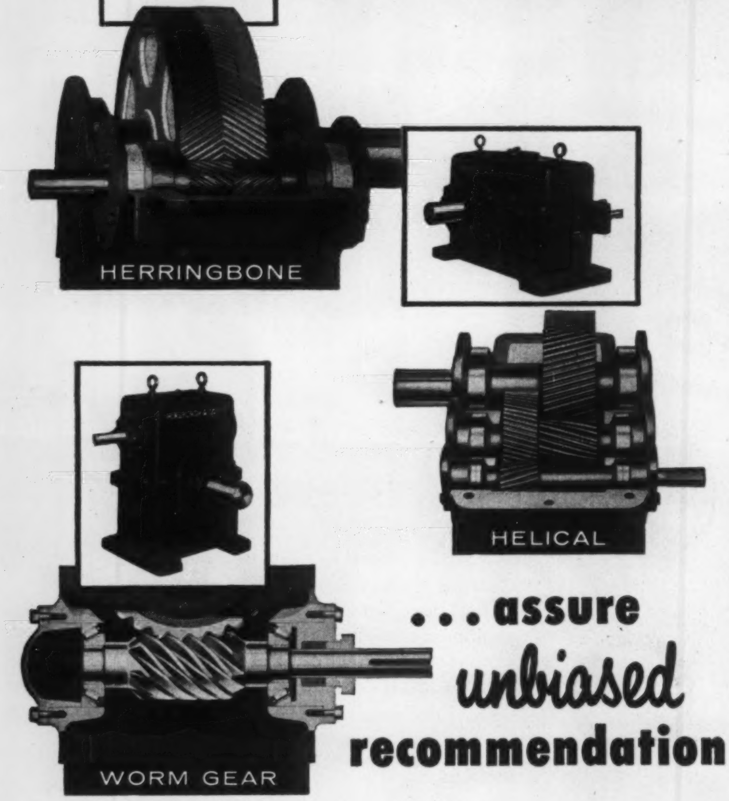
3 H&S Speed Reducers



Each of these three general groups of H & S Speed Reducers has its particular mechanical advantages which make it more efficient for specific duties. There are many considerations, such as speed of driving and driven shafts, shape of housing and drive characteristics that must be considered for lasting reducer performance and economy.

With the complete H & S line of Speed Reducers to choose from, you can be sure of our unbiased recommendation and your selection of the right type reducer for each specific job.

H & S Reducers are available in single reduction units in ratios up to 100 to 1; in combination units up to 700 to 1; and in double reduction units up to 10,000 to 1.

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JOHN C. COONLEY
President, Hydraulic Press Mfg. Co.
Mt. Gilead, O.

tion of hydraulic drives for applications requiring a high speed of response. Hydraulic motors have a moment of inertia which is less than one-fourth that of comparable electric motors and are particularly well adapted to reversing drives or where rapid speed changes must be made.

Mr. Coonley . . .

Problems of obsolescence are being met with machines that automatically improve quality and production output at reduced cost. The hydraulic industry has been responsible for many gains along these lines, with better, more efficient hydraulic pumps, better system design and integrated hydraulic and electric control.

We have experienced the trend toward higher pressures in hydraulic equipment and the need for greater output from smaller machines. Trends are initiated at the machine design level, and from our vantage point we are extremely optimistic.

Mr. Sears . . .

Demands for closer tolerances in gears and geared mechanisms are growing. Increased speeds of all types of equipment, operation and control of supersonic aircraft and missiles, higher horsepower through smaller gears, noise reduction requirements and the need for longer periods of trouble-free operation stress this mushrooming emphasis on high quality gearing.

The gear industry is investing in new equipment and strengthening its design and production engineering structure. AGMA committees are at work on such projects as the creation of improved strength and durability formulas, special studies on air-

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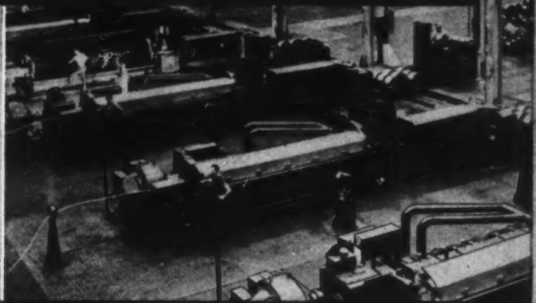
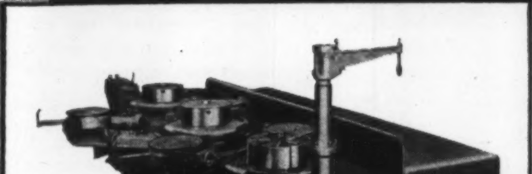


TANDEM CONTINUOUS MACHINES



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Centrifugally Cast

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Two items concerning these furnace rolls may be of particular interest:

a—the size: 20 feet long—14" OD, ¾" wall thickness

b—welding operations by which reducing cones and shafts (both statically cast of the same alloy) were welded to the centrifugally cast rolls

These two items will serve to emphasize two phases of our service: (1) the large size centrifugally cast tubes we are able to produce and (2) our machining and finishing facilities, including welding.

Our new 16-page general Bulletin—3354-G—gives complete details. Would you like a copy? When writing or calling would you mind telling us the general nature of your high alloy casting requirements? Better yet, if you have specific requirements on which we could help, let us have the details.

THE DURALOY COMPANY
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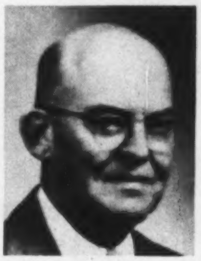
DETROIT OFFICE: 23906 Woodward Avenue, Pleasant Ridge, Mich.
CHICAGO OFFICE: 332 South Michigan Avenue

J. C. SEARS
Executive Secretary, American Gear Manufacturers Assn., Washington



J. E. OTIS
President, Dodge Mfg. Co.
Mishawaka, Ind.

frame, machine tool and control-type medium and fine pitch gearing. Also being developed is a standard for the classification of unassembled gearing to enable the user to pinpoint the degree of required quality.

Mr. Otis . . .

Trends in the field of mechanical power transmission are related to higher speeds, greater loads, simplicity, economy, convenience and the reduction of the human element in controls and operation.

Simplification and sensitivity of control, plus economy of operation, are reflected in the advancing use of air clutches.

Dry-fluid drives and couplings permit prime movers to start loads smoothly and accelerate quickly. They allow the use of smaller, less expensive motors and controls, reduce current demands and improve power factor.

Other contributions to simplicity, economy and efficiency are seen in the growing use of shaft-mounted speed reducers and taper bushings. The taper-bushed principle of mounting and locking wheels to shafts has been extended to conveyor pulleys, rigid and flexible couplings, silent and roller chain drives, chain sprockets and to dry-fluid drive couplings.

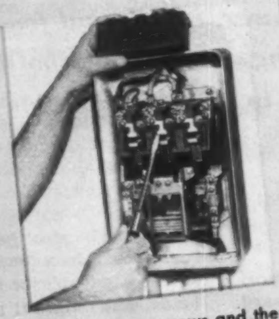
Here's Why We Specify SQUARE D Starters on the Machinery We Buy

PERFORMANCE, EASY INSPECTION AND MAINTENANCE

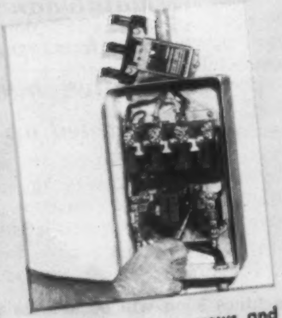
Sure, we like Square D performance because it keeps our "down time" at a minimum. BUT—everybody knows that even the best starter needs periodic inspection and preventive maintenance. We like the way Square D makes it easy to handle those routine jobs.

OFF-THE-SHELF PARTS KITS

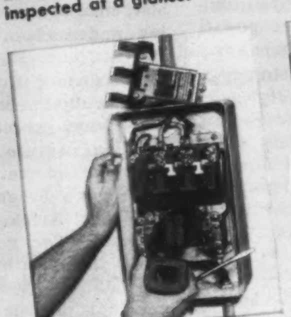
They make normal maintenance and modifications easier than ever. Packaged parts include interlocks, contacts, coils, overload relays, pushbuttons and selector switches. They're easy to buy, easy to identify, and faster to install.



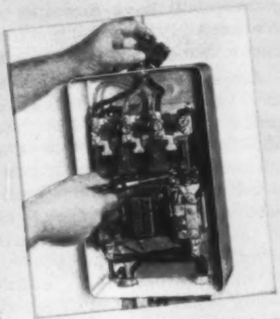
1 Loosen two screws and the arc chamber cover comes off. Every contact surface can be inspected at a glance.



2 Remove four screws and entire movable assembly can be lifted off. Disconnect two wires and slip off magnet coil.



3 Contacts are attached with separate screws—they can be removed and replaced without disturbing any wiring. A screwdriver is the only tool needed.



4 Sizes 0 through 4 starters have these separate mounting electrical interlocks for easier installation. Contact block is attached from front of panel with two screws.

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R. B. BILLINGHAM
Vice President and Gen. Mgr.
W. F. & John Barnes Co.
Rockford, Ill.

MACHINING

FORUM ON TECHNICAL PROGRESS

Maintenance costs are prime targets for equipment builders . . . horsepower, speeds and feeds are still going up . . . automation hangs on to the spotlight . . . operations will be doubled up in a single machine . . .

Mr. Newberg . . .

Machines soon will be able to produce quality products at an unheard of speed because of technological advances in machine design. With automation, machines will be linked together; will have a single operator. We are truly advancing into a push-button, forward-looking machine age.

Advances in machining techniques have greatly improved quality and productivity in the last few years. Machines and new applications have advanced to a point where dimensional control is attained with greater ease and accuracy than at any time in the history of manufacturing. Precision boring machines are capable of multiple operations, such as finishing cam and crankshaft bores simultaneously. Industry today has better control of size and finish. Center distances can be held with greater accuracy and less effort as a result in improved machine and tool design. Surface finishes on machine parts have greatly improved through the application of broaching.

Mr. Connor . . .

With the furor surrounding the automated production, better quality seems to be overlooked. History shows the two must go hand in hand.

Improved quality means not only greater precision in dimensional tolerances but also generation of the functional characteristics that make surfaces capable of carrying heavier loads and higher pressures for a longer period of service.

It is in the machining of the surface that the precision variables—size, macrogeometry, microgeometry, lay and surface structure—are affected. The real functional qualities of the surface are determined by how successfully the characteristics (tolerances and conditions) specified by the designer are generated.

To obtain the quality needed for tomorrow's designs, we must investigate and develop new methods of automatically generating precision parts. One such method is low-velocity abrading. This technique is proving that precision, along with production, is economically possible.

Mr. Johnson . . .

To label the future a challenge is an understatement. In every facet of their operations, machine tool builders will be faced with the need of and demand for greater technical progress. Emphasis will be on such factors as increased speeds and feeds, closer tolerances, greater rigidity, automation and nuclear energy applications.

One can appreciate the progress over 20 years, but the advance noted between the 1947 and the 1955 machine tool shows was unbelieveable. If the industry continues this trend, and there is every indication that it will, who can say what lies ahead?

Recently, we completely redesigned our ram-type turret lathe. By offering a heavier, more-rigid machine capable of 3000 rpm, with greater ease of operation and horsepower capacity, we attempted to meet the needs of tomorrow. But the redesigning must continue. Spindle speeds of 3000 seemed phenomenal only a few years ago—why not 6000 by 1960?

Mr. Billingham . . .

Builders are working toward further elimination of down-time factors.

Automatic machines are, in general, governed by electrical controls. The advent of Cypak, the possibility of using resistors in panels, will tend to eliminate many of the possible troubles with moving electrical components. Detector panels will locate most electrical troubles quickly. Much time is being spent in simplifying probing, gaging and inspecting stations, with an eye to having the machine completely control quality of the workpart.

We also are proceeding with the design of throwaway cutters. The results shown by some of these first tools are quite remarkable, and, in time, a great many builders will be

E. C. BULLARD
President & General Mgr., Bullard Co., Bridgeport, Conn.

P. A. GROBEY
Director, Engineering & Research
Bryant Chucking Grinder Co.
Springfield, Vt.

MARVIN R. ANDERSON
Exec. Vice President, Michigan Tool Co., Detroit

JEROME A. RATERMAN
President, Monarch Machine Tool Co.
Sidney, O.

solving some downtime by this method, and by the use of coolant.

We have an indication of future work now on drawing boards in the automotive field. There will be a liberal use of diecastings, extruded steel and new casting techniques. The builders of equipment for machining and handling equipment will have their facilities taxed to take care of the demands upon them.

Mr. Bullard . . .

Automatic control of machine tools is an accomplished reality. There is no doubt these modern controls will benefit labor and management alike. Ease of setup, single pushbutton-station control for all machine functions, automatic positioning of work and cutting tools—all add up to less operator fatigue, which, in turn, means more production at less cost.

The need throughout industry for trained engineering personnel from qualified schools and colleges will correspondingly increase as more and more machine tools of modern design are put in to production. Statistics show that our industrial growth requires 40,000 new engineers annually. Last year, accredited schools graduated only 19,650. Educators, labor and industry must aim their sights at this problem.

Mr. Grobey . . .

Efforts toward greater productivity have resulted in automated lines which usually consist of more or less standard machine tools surrounded by a large amount of auxiliary equipment. Often there is a maze of cables and conduits leading to limit switches and other electrical controls. Obviously, this is not the ultimate solution to automatic production.

A great deal of work is being done to improve the accuracy and dependability of machine tools and to simplify the system by incorporating the operations and work motions into the basic design. Further development will lead to automatic production units designed to produce parts from rough stock to finished piece. Before industry can go much further in this direction there are certain major problems to be solved, chiefly in the field of electrical controls.

The control system of a modern unit usually incorporates automatic sensing devices for inspecting work and for measuring such quantities as slide travel and tool loads. Most measuring elements require their own power supply, which adds greatly to the complexity of the system.

Mr. Anderson . . .

The biggest development in gear production last year was the automated line. We can supply volume gear producers with a line that will start with a blank at one end and turn out a hardened, finished and inspected gear at the other. The gear is not touched by an operator anyplace along the line.

Although such a line is not in operation, we are not theorizing. All the elements are available. They have been proved in production. Before the end of this year, we may see one or more of these lines in operation at the plant of a major gear producer. As we see it, the smooth operation of the line requires a storage and distribution system that does not have to be compeltely full for a part to move along to the next operation. Parts go into storage on a first-in, first-out basis, and it is possible for a single part to go through the line without any holdups.

While automatic lines are useful only to volume producers, the companies which do not have enough volume of a single gear, pinion or spline to justify such an installation, or those which prefer unitized groupings of gear production equipment, also benefit from this development work.

Mr. Raterman . . .

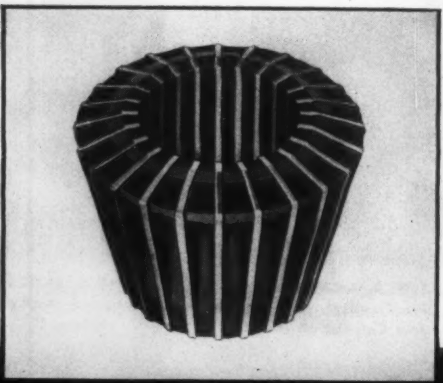
Machine tool designers are giving attention to small-quantity production with several costly setups per day where the use of automatic machinery would be prohibitive.

One device can be brought into use in a matter of seconds by a previously punched card which can be used over and over for succeeding lots. This reduces setups to the minimum and makes the cycle largely automatic. The punched card controls multiple successive cuts, such as roughing and finishing, and determines the diameter and length of each cut and speeds and feeds to be used for each.

An answer to the complicated part is the tieing together of two, three or a whole series of automatic machines.

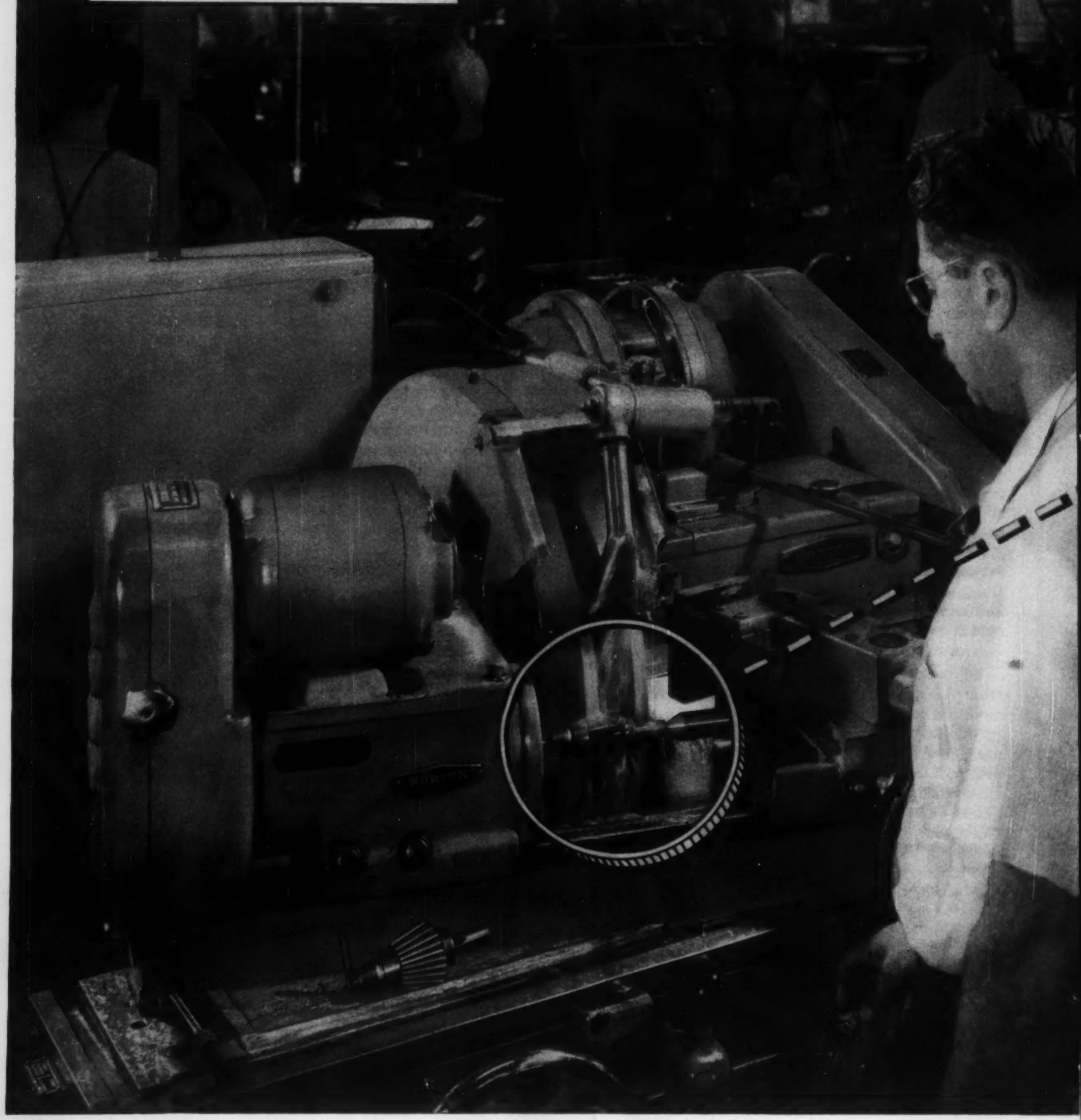
Further progress also has been made toward reducing the nonproductive elements in the operating cycle of lathes through a simplification and more convenient grouping of machine controls.

There also have been recent improvements in tracer mechanisms for lathes. Particular attention is being given to further refinements in the quality of finish which can be imparted to contour surfaces. In fact,



Once again!...

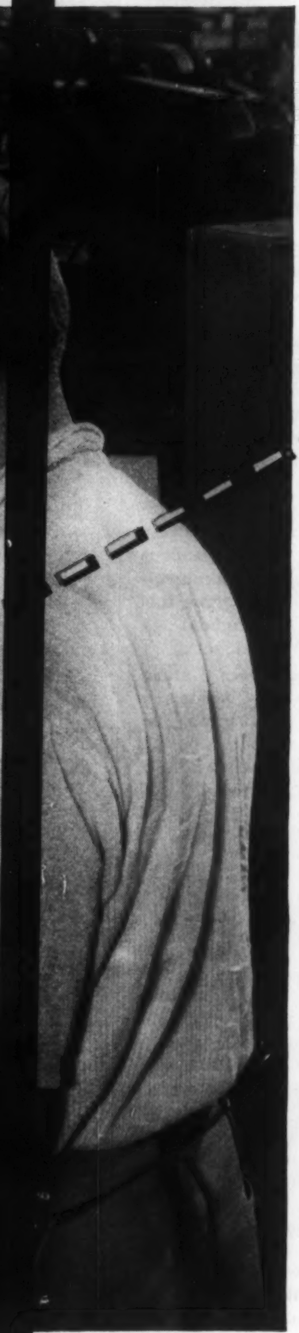
Jacobs doubles



production rate–

grinds
100%
faster

Leading chuck manufacturer uses Norton machines to cut grinding time in half



When a leader like The Jacobs Manufacturing Company selects equipment, you can be sure that this equipment has had careful study from every angle of performance and cost.

That's why Jacobs' choice of Norton grinding machines is worth serious consideration when *you* are buying grinding machines.

In producing their famous Rubber-Flex Collets, for example, Jacobs reports that switching from separate operations to a single operation on Norton Type CTU Semiautomatics with multi-wheel mounts has doubled their production rate. *Jacobs reported similar production savings in grinding chuck bodies on the same type of Norton machines.*

Another manufacturer has boosted production from 300 to 600 parts per hour by grinding 2 diameters at once on a Norton machine. Still another reports that a Norton grinding machine with a triple-wheel mount has upped his production rate 128%. Throughout industry, manufacturers are using Norton grinders and lappers to save time, work and money in grinding operations.

Norton Machines in Your Own Grinding bring the same profit-increasing advantages. And remember: only Norton offers you such long experience in both grinding wheels and machines to help you produce more at lower cost.

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In the Jacobs Plant. One of the Norton 6" Type CTU Semiautomatic Grinding Machines used by The Jacobs Manufacturing Company of West Hartford, Connecticut, to grind metal inserts in the famous Rubber-Flex Collets. The basically fast action of this Norton grinder, the multi-wheel mount, special swivel table arrangement and wheel-truing device provide a single setup for traverse and shoulder grinding operations that boosts production rate 100%.

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Springfield, Vt.

LYMAN K. SHEPARD
Machine Tool Sales Mgr., Hartford Special Machinery Co.
Hartford, Conn.

ALAN MATTISON
President, Mattison Machine Works
Rockford, Ill.

the increased accuracy and productivity possible with today's new machine tools make it more and more costly for those who would try to produce competitively without them.

Mr. Maynard . . .

Segmented transfer machines probably will be the basis for most new designs of the inline type. These are the machines made up of a series of units, each having an individual base and control panel.

Checking of complicated electrical control circuits on large transfer machines is fast becoming a major maintenance problem. New techniques are being applied in master control panel design which will enable quick checks of circuits with probing devices to isolate the machine area causing trouble.

Better deliveries for automated, special machine tools can be anticipated as a result of aggressive design standardization programs which cut engineering time and simplify processing and manufacturing of details by the machine tool builders.

Mr. Praeg . . .

Gears produced in automated lines must be checked 100 per cent for accuracy and noise level to assure continuous high production rates. Suitable equipment has been developed to meet these needs. Included in this new equipment are motorized gaging and sorting machines, as well as automated testers that include automatic sound detecting devices.

A process for shaving conical involute gears is evoking much interest by designers of equipment requiring angular drives. Such gearing is being produced for the power steering mechanism of a leading automobile manufacturer.

A new method of hard gear finishing is being made available. The method improves sound characteristics and tooth finish of spur and helical gears after they have been heat treated. It also removes nicks and burrs from hardened gears.

Mr. Whitmore . . .

The Machine Tool Show was a significant revelation of the status of development of the industry. The impact was especially strong in several specific areas.

Higher horsepowers and higher rates of stock removal were everywhere in evidence, with the heavier machine structures necessary to make this possible. Control systems, electrical, electronic and hydraulic, were emphasized and were more comprehensive and complex.

The tying together of several automatic machines into an integrated system, with automatic transfer of workpieces between machines, emphasized the importance of relating each operation to those preceding it and those following it. An impressive amount of automatic gaging was displayed, with much of it tied into the machine cycle to shut down the operation in the event of out-of-limit parts. In some cases, the gaging indicated corrective action to the machine to make the process self-regulating.

Mr. Shepard . . .

There's a "do-it-yourself" trend in industry almost equivalent to that in the consumer field. Availability of automatic drilling units, along with automatic work indexing devices, machine bases and other standard machine tool elements, has allowed manufacturing engineers and methods men to use their ingenuity to the fullest extent in the development of special-purpose, high-production drilling and tapping machines to process their own products at tremendous savings. This art, once belonging almost exclusively to the machine tool builder, has spread throughout almost all industries.

At the close of World War II about five manufacturers offered automatic drilling units as packaged power units for single-purpose production machines. Now, over 20 manufacturers are selling such units to metal products manufacturers.

Mr. Mattison . . .

Suddenly, we are seeing the logical extension of automatic production principles to transfer-type machines that go beyond machining operations into assembly of fabricated products. Automobile engines are being completely assembled in automatic production machinery.

This principle emphasizes accurate machining, with an urgency that has not existed since interchangeability of component parts first made mass production techniques possible. In addition, increased use of hardened surfaces for wear resistance, new alloys and new techniques in hardening of metal have all contributed to

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Dromus Oil E immediately ended Wendel's trouble. The drill and steel bar stock were very cool and easy to handle. Chip settling was excellent, and discoloration of tools and work was completely eliminated.

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ARVID LUNDELL
President, Colonial Broach & Machine Co., Detroit

the need for accuracy and improved metal removal methods.

With these factors, industry is becoming more grinding conscious. High-powered, precision machines are gaining recognition as a metal-removal, rather than a metal-finishing method.

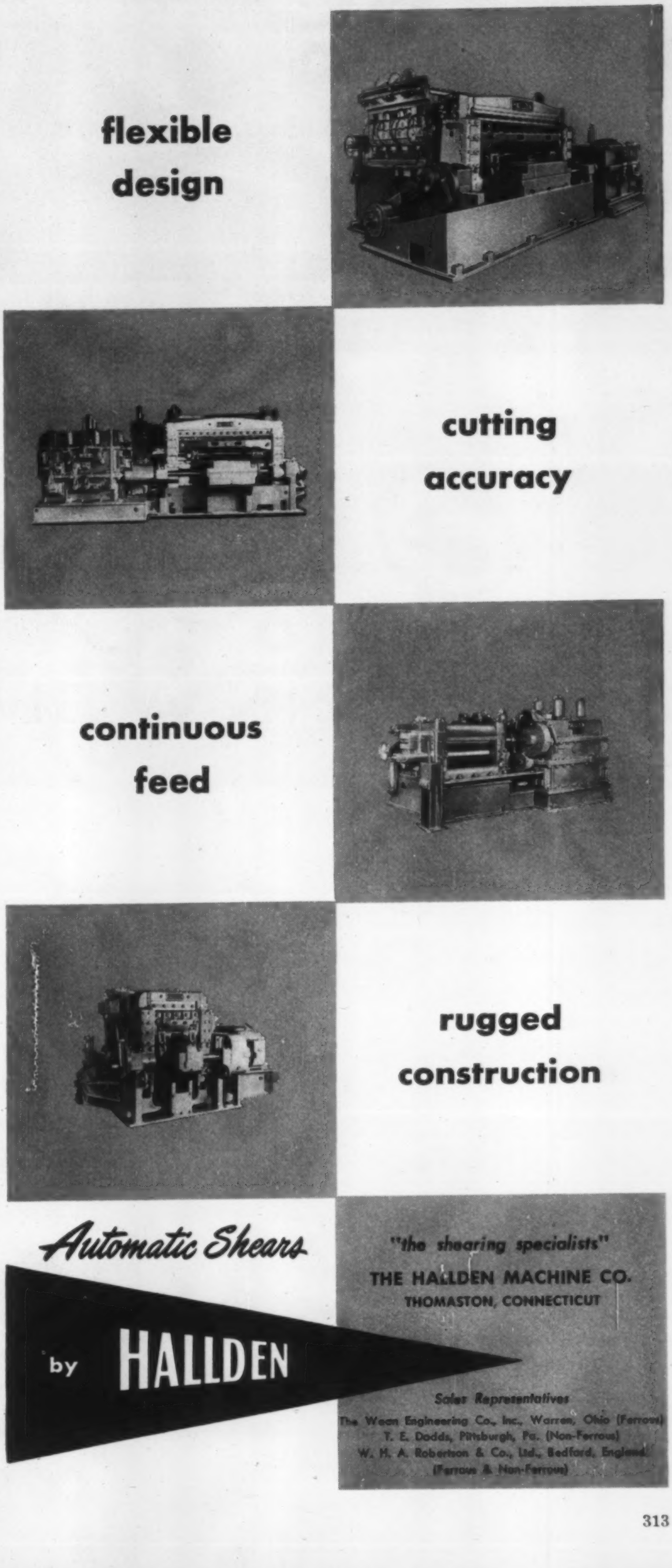
Improvements in grinding wheels, applications of higher horse-power and greater understanding of surface grinding principles are behind a definite trend toward the design of parts for grinding. The results have been a reduction in manufacturing costs, increased accuracy and high quality finishes.

Mr. Lundell . . .

There is no ready answer to what type machine is best suited to any particular operation. Although the subject of ram speeds, like automotive horsepower, has attracted a great deal of attention, it is not the answer in itself. There's a lot more to selecting a broaching machine for a manufacturing operation than just considering the rate at which the cutting tool passes over the surface.

We have felt the most successful jobs are those in which we and our customers studied the elements required without preconceived ideas and then selected the machine and designed the fixtures, as well as the broach itself, to take full advantage of all the job's requirements. Sometimes the best answer is a mechanical machine with a high ram speed. In other instances, higher production can be achieved with a hydraulic machine and a fixture that shuttles, trunnions in, indexes, etc.

Even a seeming similarity between two parts can be misleading insofar as the best solution for the broaching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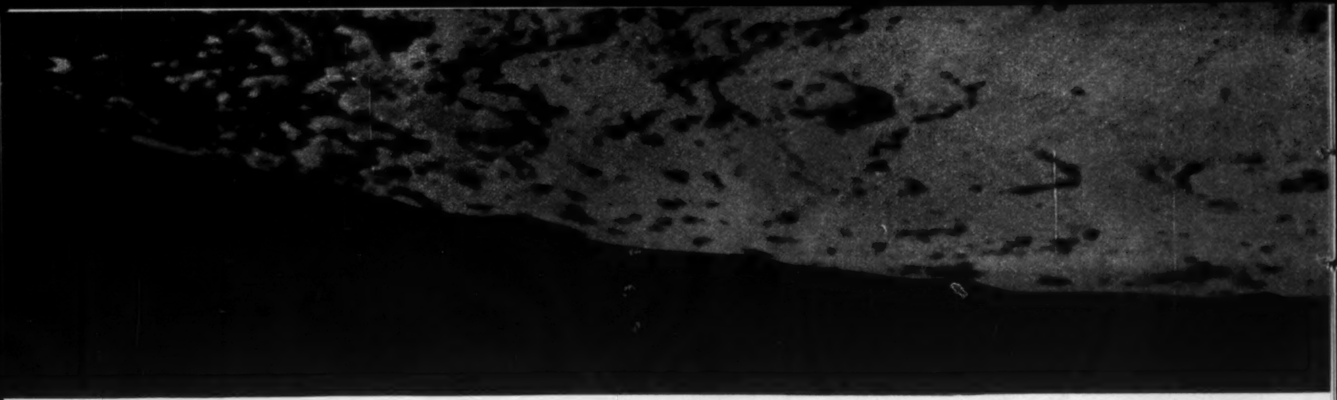
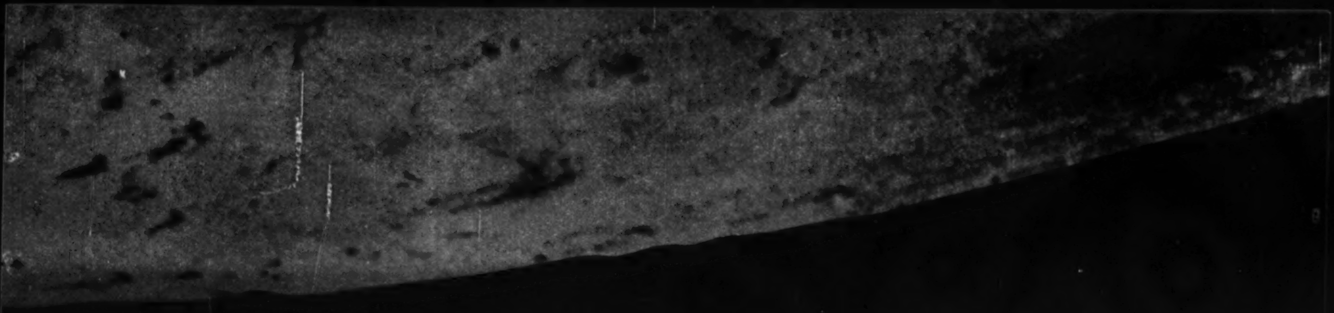


ONCE IN A BLUE MOON



Jones & Lamson is in the habit of coming up with excellent turret lathe developments, but only "once in a blue moon" do we offer so *many* at once.

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Detroit

setup is concerned. Minor differences in the nature of the part, tolerances required and the production rate necessary may require major differences in fixturing, even a different machine.

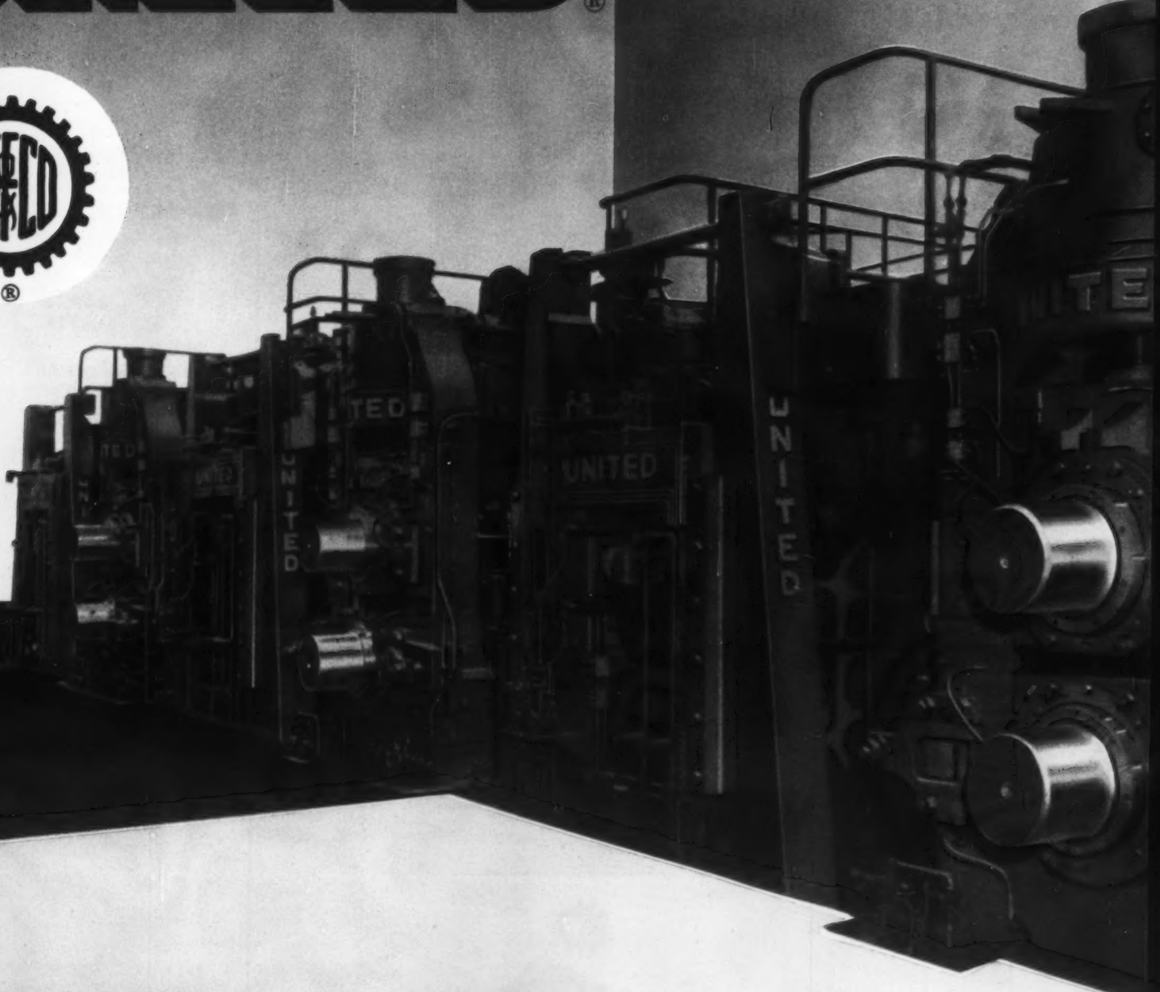
Mr. Hicks . . .

Equally as important as automation in cost cutting is the combination of operations into a single machine either by using several grinding wheels on a single wheel mount or with multiple wheel units in a single machine. Not only does this give faster and lower-cost production, but it also cuts down the number of automatic loading and unloading units required.

In spite of an obvious work rotation problem, it is often practical to grind on opposite sides of the work simultaneously, using two or more unitized grinding wheel units. The differential in speed between the wheel and the work is so great that direction of rotation of the work may not affect the result.

Mr. Bixby . . .

Manufacturers look to machine tool builders for means of increasing production without proportionately increasing the labor force. The gen-



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J. P. CROSBY
Vice President, Lapointe Machine Tool Co., Hudson, Mass.

eral shortage of manpower and the continuing demand for consumer goods make this step necessary. There are many ways of accomplishing greater production.

First and obvious steps for increasing output are through multiple tooling, more elaborate tooling—tooling that includes work handling, orienting, loading and ejecting. Such tooling in many instances can be applied to standard machines.

Another step in obtaining greater production is done by the single-purpose machines designed and built to perform specific operations on a given part. Many automatic functions also can be built into these machines. The greater original investment required means there must be a need for sufficient production volume to justify the cost.

The third step is automation. Machines in automation lines, in addition to performing metal-cutting and gaging operations, also are assembling units and testing the assemblies.

Mr. Crosby . . .

High-speed broaching will force the development of suitable tooling to reap all benefits that machine develops.

The jet aviation industry showed the advantages of high-speed broaching, and now the automotive and other industries are quickly changing over.

To use the electromechanical drive, the machine must be rugged. Cutting tools must be designed for maximum speed to obtain the high tool life, less down time and high rate of production available.

If industry is to meet the predicted 40 per cent increased demand for

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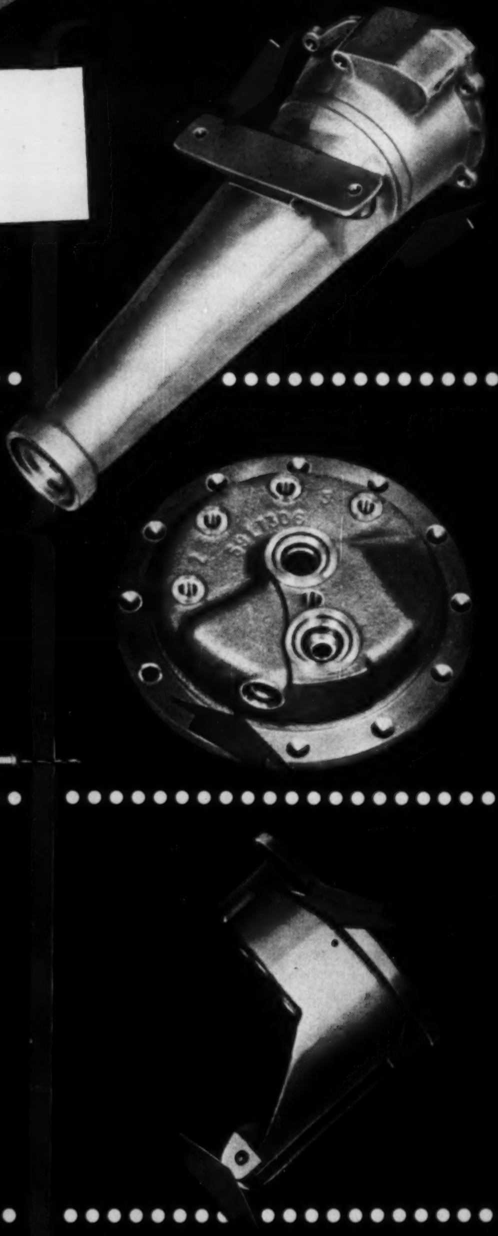

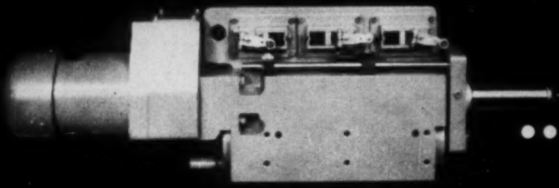

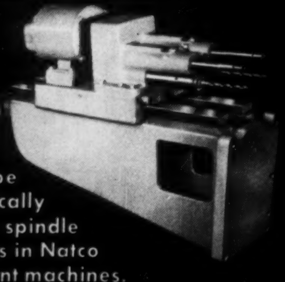

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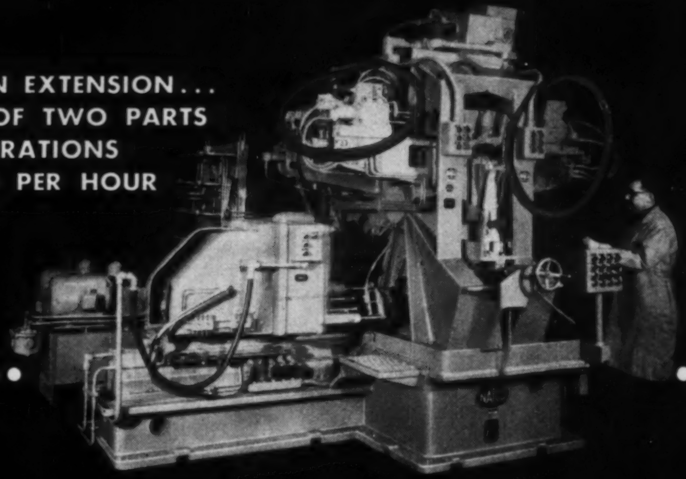

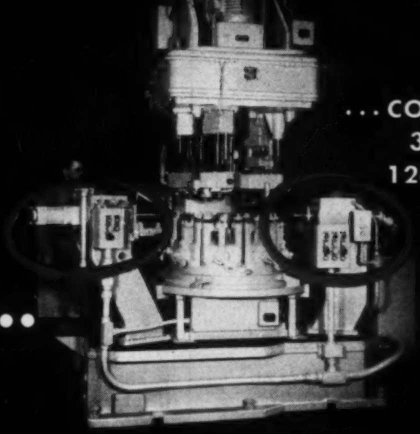

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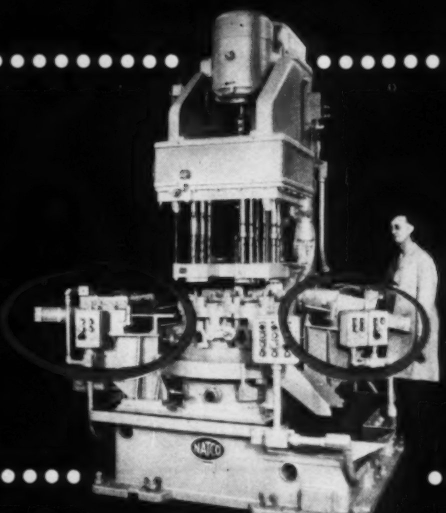

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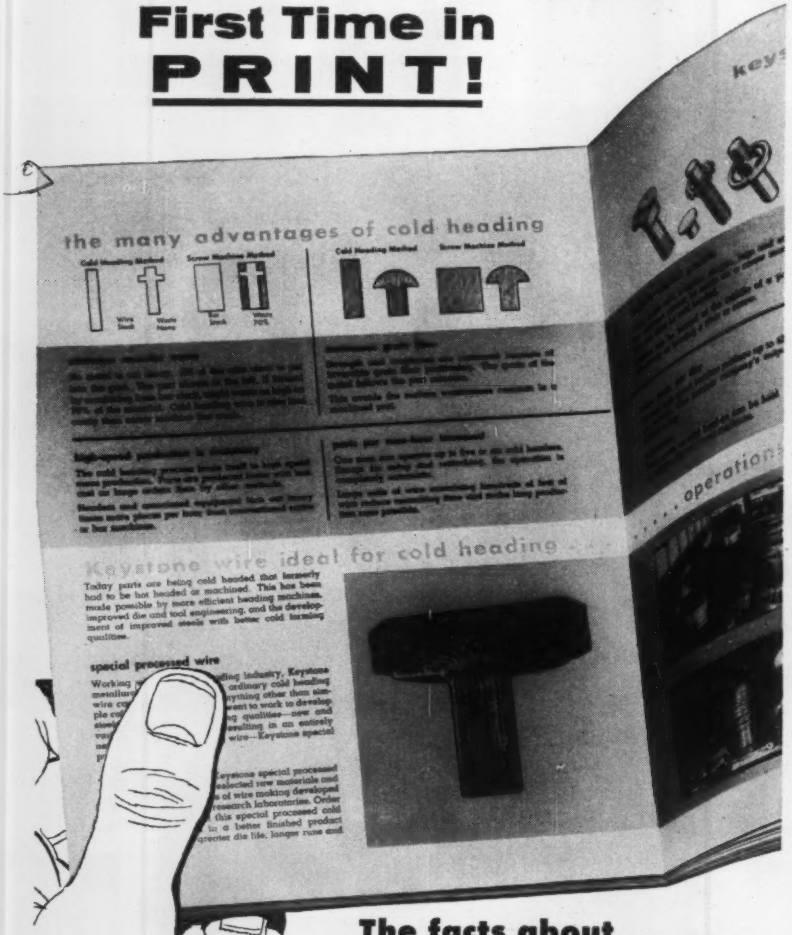
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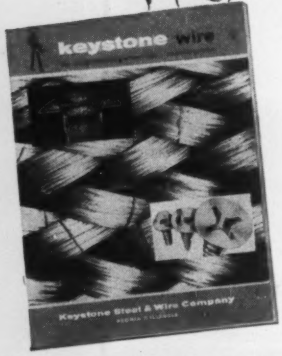

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goods by 1964, with only a predicted increased work force of 13 per cent, then the high productivity of electromechanical drive broaching machines is a positive requirement today.

Mr. Bailey . . .

The machine tool industry should do more business in 1956 than it did in 1955.

This forecast is based primarily on the sales outlook for our own company. Standard general-purpose machine tools go to all types and sizes of plants. They serve practically every industrial field. Orders for new machines are materializing, in growing volume, from every segment of our market.

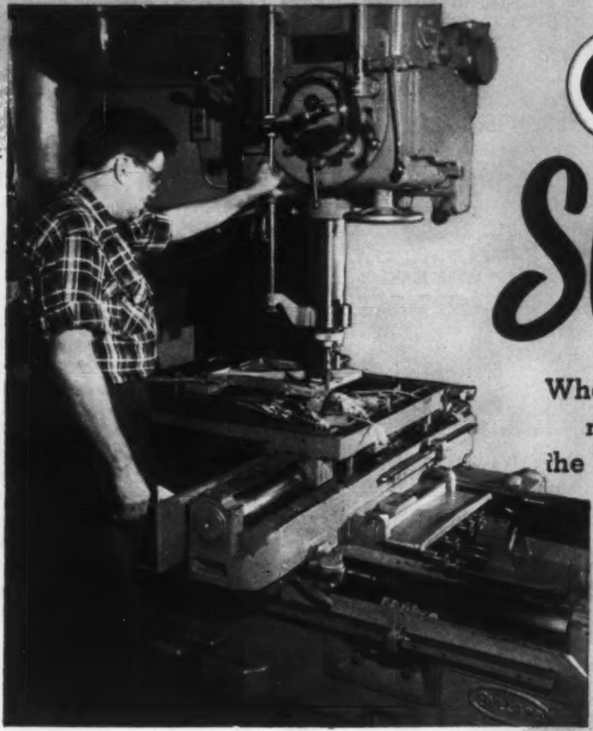
This rising demand reflects three factors: 1. A growing volume of industrial production. 2. The imperative need to reduce manufacturing costs. 3. The development of automatic controls which have made older models obsolete.

Mr. Colwell . . .

So far as the necessary machines are concerned, the automatic factory is here. Our concern for the immediate future is how and how fast

ACCURATE LOCATING PERFORMANCE

Acclaimed By Customer with . . .



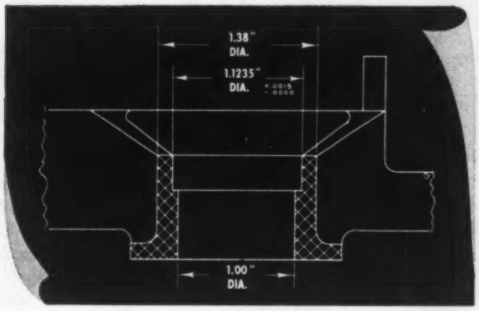
BULLARD Spacer Table

Where close tolerances must be maintained on repetitive pieces the Bullard Spacer Table is a "natural"

"The machine is simple to operate. We have found the Bullard Spacer Table very useful in our work", says a foreman at San Diego Division of Convair, "It eliminates the necessity of zeroing to a set position. And there is no chance for error, which is important when you make accurate parts for airplanes."

This same accuracy to close tolerances can be applied to your drilling, reaming or tapping operations without the high cost of jigs or fixtures.

Identical machining operations on each of three holes for battery carriage are performed on the Bullard Spacer Table.



OPERATION DATA

OPERATION	SET-UP TIME	UNIT TIME
Drill 1" dia.	.70	.2066
Counterbore 1.1235" dia. at 1.000 dia. .350" deep	.25	.0566
Face 1.38" dia.	.25	.0356

CALL YOUR NEAREST BULLARD REPRESENTATIVE
OR WRITE FOR SPACER TABLE CATALOG TO

THE
BULLARD
COMPANY
BRIDGEPORT 2, CONNECTICUT

How to get the most out of EASY-FLO and SIL-FOS brazed construction

Thousands of metal parts are now made from stampings, screw machine parts and tubing joined with one of the EASY-FLO or SIL-FOS low-temperature silver brazing alloys. That's because this method makes a wide range of parts faster, better and at far less cost than by casting, forging and machining from the solid.

Many manufacturers are getting the full benefit of the speed and economy of EASY-FLO and SIL-FOS brazed construction by using setups that combine *preplacing* the alloy with fast handling and heating of assemblies.

EASY-FLO 45 WIRE RING

ALLOY FORMS

EASY-FLO and SIL-FOS alloys are available in any of the forms shown below in a range of diameters, gauges and sizes to meet specific preplacement requirements.

Such a setup is shown above. It's used to braze a threaded spud into a shell stamping to form an electric plug part. As table rotates, assemblies with EASY-FLO 45 wire ring preplaced as shown, pass at predetermined speed through the induction heating coil at rear. Gearing revolves the assemblies. Operator simply keeps removing finished parts and reloading for an easy output of 250 an hour.

EASY-FLO and SIL-FOS are the key factors

That's because these alloys just naturally produce high-strength, leak-proof, virtually indestructible joints in ferrous, non-ferrous and dissimilar metals with unmatched speed and economy.

Our specially qualified Distributors cover the country. They're ready to give you prompt supply of EASY-FLO and SIL-FOS and experienced help in applying them. Write for the "Distributor List" and contact the nearest one. We'll send along a copy of Bulletin 20 which tells all about the alloys.

HANDY & HARMAN

General Offices: 82 Fulton St., New York 38, N. Y.
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DETROIT, MICH.
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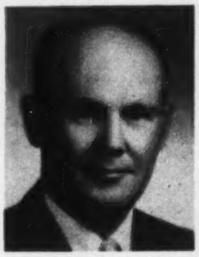
There's no ". . . or equal" for EASY-FLO and SIL-FOS



RALPH J. KRAUT
President, Giddings & Lewis Machine Tool Co., Fond du Lac, Wis.

this equipment can and should be put into operation.

Automatic programming in particular will require extensive overhauling of existing procedures in engineering drawings, production planning, machine maintenance, quality control, etc. In the majority of cases, the automatic factory does not mean the elimination of personnel, but it does require a drastic change in the skills and activities of personnel.

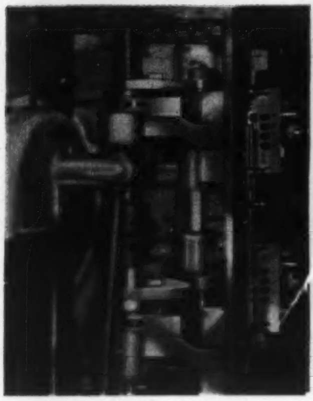
Traditional machining practice involves making settings on machine tools to produce the sizes and locations. In automatic programming, the machine does its own reading, either from a drawing or from a list of numbers provided in different ways. In either case, traditional drawing practice must be revised to permit effective operation.

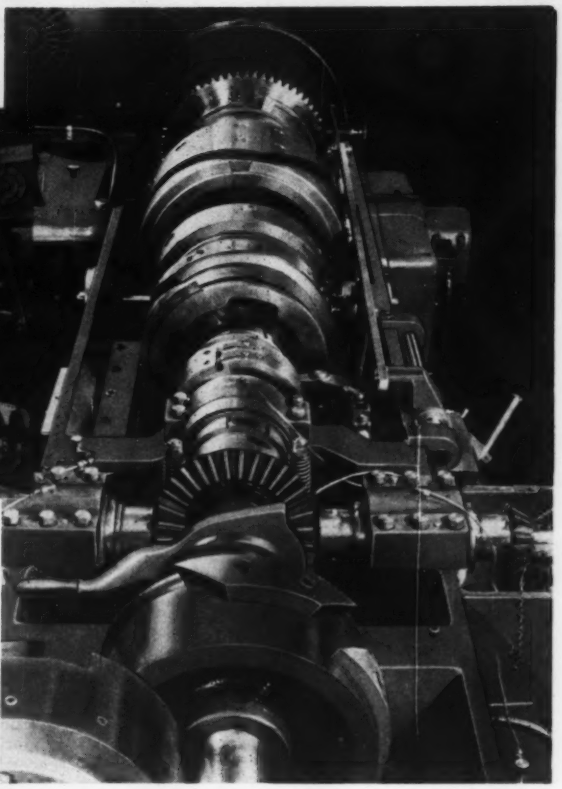
Mr. Kraut . . .

Authorities tell us that production will double our standard of living and decrease our standard work week from 40 to 35 hours—all this in 25 years.

Playing no small part in this upsurge of productivity and general economic well being will be the increasingly extensive use of automation in the machine tool industry. Automation means that a completely new field of industrial design has been unveiled. New product designs, previously sidetracked because of limited manufacturing processes, will be able to make the shift from fantasy to reality. Design will no longer be handicapped by fixed forms, difficult contours or limited controls.

While applicable to virtually any machine tool, we have applied our Numericord system to control aircraft-type spar and skin milling machines in performing all plunge, channel, pocket and contouring cuts necessary to mill complete jet plane skin and wing panels.



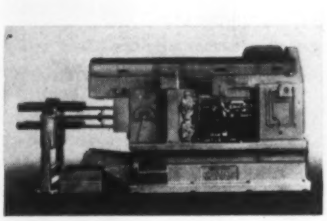


Conomatics Provide Radial Screw Adjustment of Forming Tool Slides

● Models $2\frac{5}{8}$" LA, $3\frac{1}{2}$" AD, 5" KL, and $5\frac{1}{4}$" KR Conomatic Four Spindle Bar Machines are equipped with a number of quick job-change features. One of these is the all-position end attachment drive for the mounting of endworking opposed spindles in all positions, with independent feed to as many as three opposed spindles on a single setup.

Another feature that is of considerable importance in tooling up is the radial screw adjustment of all sideworking slides. Trial cuts may be taken to correct diameters with form tools without changing the clamped positions of the form tool holders.

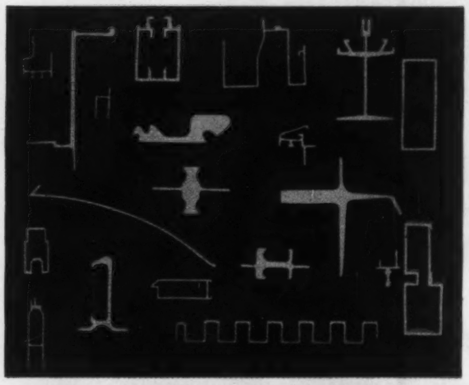
All Conomatic quick changeover models are equipped with dial adjustment of the working stroke of all tool carrying slides. Besides the Four Spindle machines there are three quick change Six Spindle models in $\frac{9}{16}$", 1" and $1\frac{5}{8}$" sizes. Write, wire, or phone for literature.



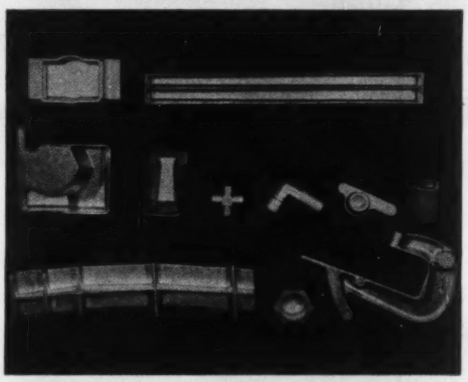
Conomatic

CONE AUTOMATIC MACHINE COMPANY, INC., WINDSOR, VT., U.S.A.

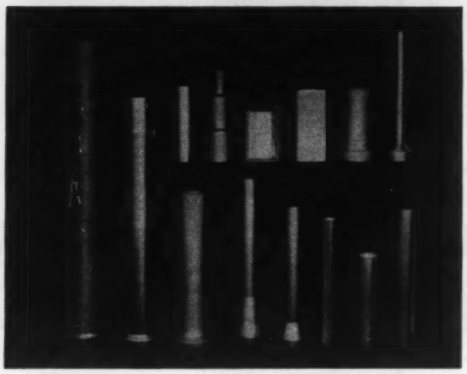
You can make it faster and better *with* Harvey Aluminum



EXTRUSIONS . . . For decorative as well as basic parts, custom-designed aluminum extrusions replace riveted and welded assemblies . . . simultaneously adds strength, simplifies fabrication.



PRESS FORGINGS . . . Where parts must combine maximum strength with savings in weight, cost and manpower, Harvey aluminum forgings often completely solve the problems encountered by the designer.

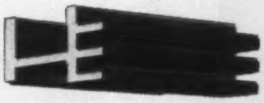


IMPACT EXTRUSIONS . . . Thin-walled, tubular structures can be produced by this method and held to very close tolerances. Machining is practically eliminated; scrap is greatly reduced.

Harvey is a leading independent producer of aluminum extrusions in all alloys and all sizes, special extrusions, press forgings, hollow sections, structurals, rod and bar, forging stock, pipe, tube, impact extrusions, aluminum screw machine products and related products. Also similar products in alloy steel and titanium on application.

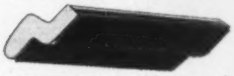
MAKING THE MOST OF ALUMINUM . . . FOR EVERYONE

HARVEY Aluminum

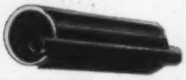


STRUCTURALS . . . High strength, light weight, workability, corrosion resistance. Aluminum extrusions combine all four . . . are ideal as basic load-bearing members.

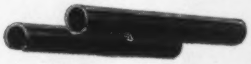
MACHINING STOCK . . . Harvey deep-drawn hex and round stock set a new mark in uniform grain structure—consistent from surface to core. This means fast, chatter-free cutting, long tool life, few rejects and true threads.



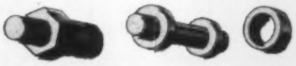
FORGING STOCK . . . If you make your own forgings in quantity, Harvey extruded forging stock can save many intermediate steps. Custom-designed extrusions whose cross sections approximate the forged blanks may be cut to length.



EXTRUDED PIPE AND TUBE . . . Seamless . . . uniform in structure, size and shape . . . clean and smooth inside and out . . . easily formed. Usable in applications ranging from portable irrigation systems to aircraft heat exchangers.



DRAWN TUBE . . . Combines strength and high finish . . . ideal for TV antennas, furniture, and similar products. Cold drawn for structural uniformity . . . and the temper is specially controlled for good workability.



SCREW MACHINE PRODUCTS . . . The West's largest installation of multiple-spindle screw machines can reduce your manufacturing costs. Harvey carries your job through from engineering to quality control.

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TORRANCE, CALIFORNIA
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LOUIS POLK
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TOOLING AND GAGING

FORUM ON TECHNICAL PROGRESS

Gages become ensconced in the production line . . . look for more multiple tooling . . . carbide throw-away inserts may be the answer to automatic tool change . . . the emphasis is on larger die blocks . . . machinability of medium-carbon die steels is up for study . . .

Mr. Fletcher . . .

We've seen growing acceptance of free-machining high speed and die steels. Further research is pointing to successful extension of the free-machining principles to the medium carbon die steels, used in diecasting, plastic molding and forging dies. It is even likely that these steels may be produced in the prehardened form, eliminating the necessity for heat treatment, while maintaining machinability at a tolerable level.

Continued trends toward upgrading tool steel applications will undoubtedly take place. The use of more of the high-abrasive-resistant, high-speed steels and die steels with 3 per cent vanadium content and over is expected to result in increased tool productivity.

Research into methods of making larger die blocks and heavier bars of tool steel to the highest quality standards is rapidly progressing.

Mr. Hughes . . .

We will utilize electronic equipment to compute grinding wheel formulas. Selection of grinding wheel specifications must still be done by thoroughly trained men with a technical knowledge of grinding applications. Once the proper specification from the thousands of possibilities has been chosen by the abrasive engineer, his selection can be fed into an electronic computer that will precisely determine the ingredients from which the wheel is to be manufactured.

Electronic precision replaces the possibilities of human error in figuring formulas. The formulas are preserved on punched cards, insuring absolute accuracy in duplicating subsequent manufacturing instructions for the same wheel.

It will not be too far in the future when similar electronic computing systems will be applied to the manufacturing processes, with the ingredients of abrasive products being selected, measured, combined and processed.

Mr. Wilkie . . .

The great hubbub over the new word "automation" indicates public confusion and misconception of what makes progress. We have been brought, by the nature of our business, face to face with the true meaning of Thomas Carlyle's famous statement: "Man is a tool-using animal, weak in himself; without tools he is nothing, with tools he is all." But the public is not aware that tools are responsible for all our economic gains and cultural achievements.

Those associated with production enterprises are the only ones close enough to the economic facts to give the public the guidance that is so greatly needed.

Mr. Polk . . .

Advances in automatic gaging and control are providing new standards of product quality and operating efficiency and economy. During the last few years, the development of air-electric and electronic gaging, sorting and feedback circuits, coupled with ingenious transfer mechanisms and statistical quality control recorders, has made possible the incorporation of automatic inprocess gaging as a means of machine control.

Indeed, inprocess gaging is among the most noticeable of current trends and can be expected to continue with even greater acceleration. Instead of representing a remote operation performed away from the machine, gaging is done on the machine, either before, during or after the machining. Resulting benefits have included not only greater precision of form and surface, but economies in scrap reduction and floor space requirements and a more rapid production cycle with less inventory.

for a
better product

start with

BETTER

STAINLESS STEEL STRIP

SPECIFY

WALLINGFORD

Modern machines, advanced atomic and electronic quality control devices and quality-conscious personnel make WALLINGFORD STAINLESS STEEL STRIP *better* . . . and make the manufactured product *better*.

Better strip means better output, too. WALLINGFORD STAINLESS STEEL STRIP gages uniformly, draws easily, punches cleanly . . . to reduce spoilage and tool costs.

- THINNESSES TO .002" • ACCURACY TO ± .0001" • SPECIAL SECTIONS ROLLED TO YOUR EXACT DESIGN

A visit to our offices and plant will convince you that Wallingford quality is unmatched.

THE
WALLINGFORD
STEEL CO.
WALLINGFORD, CONN., U.S.A.

STAINLESS • ALLOY • HIGH CARBON • LOW CARBON
STRIP • STAINLESS WELDED TUBES AND PIPE

R. A. SOULER
Automatic Control Engineering
Federal Products Corp.
Providence, R. I.

HENRY R. MERRILL
Industrial Sales Manager, Behr-Manning Corp., Troy, N. Y.

Another trend has seen a single gaging machine, operating with synchronization and memory systems, monitor a group of machine tools producing identical parts and control the machine or machines out of control.

Mr. Souler . . .

Gages are forming a new-found role today and look to be in line for an even greater part in the future. Today's manufacturer will build a gage to measure your part when and where you want it gaged. Men responsible for processing parts look at their products under a new and different light. Processing machines are more ingenious and more humanlike. Working tools and cutters are still subject to dulling, wear and breakage. The part may not be machined correctly. With that in mind, gaging in the process or following the process are logical steps to consider.

Mr. Merrill . . .

Automated application of belts and contact wheels is taking hold more strongly each year. As automation is becoming more practice than theory, coated abrasive belt techniques bred in Detroit are making it

Here's the story...

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In this revealing book, Century shows how and why the *New Standard*, smaller motors actually out-perform the larger, heavier Old Standard models.

These trim, compact "*New Standards*" give you weight savings up to 40% . . . plus space savings and easier installation. Dead weight and dead air space are eliminated. The "active materials," such as iron and copper, are designed to give greater efficiency than ever before. New synthetic insulating materials give greater dielectric strength and uniformity.

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Profit Grows When The Oil Can Goes!

BIJUR

Automatic Lubrication

You can profit many ways with Bijur Automatic Lubrication. Take a look at the machine tools in your plant . . . chances are they are equipped with Bijur! You are profiting by increased production capacity, reduced maintenance, less down-time, longer machine life and—most of all—by eliminating costly hand oiling.

Why not pass on to your customers these same advantages—build a Bijur system right into the machines you manufacture. You will profit again in goodwill and increased sales.

Bijur Automatic Lubrication is custom-engineered to your equipment. Customers will be assured trouble free service . . . every bearing receives the right amount of oil metered according to individual service requirements.

This dual benefit is just another reason why, for more than a quarter of a century, Bijur has been the accepted standard for automatic machine lubrication.

On the equipment you buy and on the equipment you sell, insist on the best . . . insist on Bijur.

Literature and engineering data are yours for the asking

P-1

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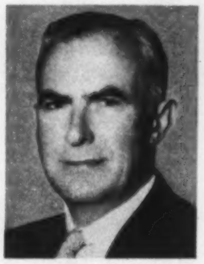
Pioneers in Automatic Lubrication



K. R. BEARDSLEE
General Mgr., Carboloy Dept.
General Electric Co., Detroit

easy for polishing and grinding lines to lead other processes.

Wearable wheels came out last year. And 1956 should see them eliminate a lot of mechanical complexity in polishing lines, reduce operating costs, decrease the number of swipes necessary to produce proper finishes and accelerate the mechanization of fine-finish lines.

Close tolerance work with abrasive belts is increasing, and is opening new opportunities as more machine tools are adapted to belts and contact wheels. This year will bring more types of machine tools using belt cutting and microfinishing—and looking more like the familiar lathes, planers, reciprocating grinders, broachers and milling machines. Two and more belts often will be at work in one machine.

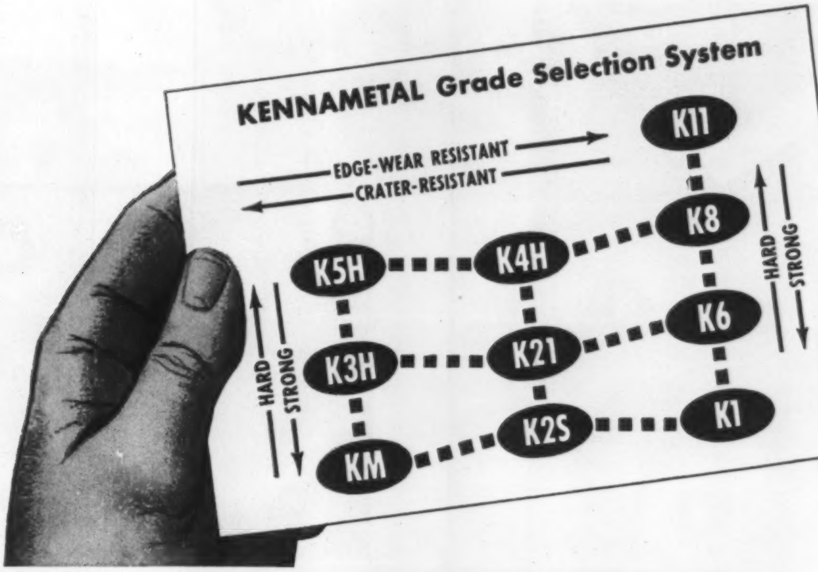
Of course, the *special* machinery now so actively in development will lead to the appearance of *standard* machine tools using coated abrasives for precision stock removal.

Mr. Beardslee . . .

Cutting tool materials must be engineered with the best materials, designs and controls to take advantage of the production economies offered through completely automatic metal parts processing.

Invaluable aid to this end will be provided by the machinability computer which takes the guesswork out of horsepower, material and tooling requirements. The computer brings home the importance of selecting the proper kind of tool material for a specific cutting task. It shows that other factors are as important as cutting angles. They include: Metallurgical properties of the cutting medium, the material being cut and its heat treatment, the speeds and feeds used, and horsepower.

Cemented carbides in themselves



EXACT GRADE SELECTION NOW MORE VITAL THAN EVER ON YOUR NEW HIGH PRODUCTION MACHINES

Many metalworking shops are drifting along in a sea of profitless operation due to improper tool selection. Numerous shutdowns for tool replacement or regrinding, excessive tool breakage, or shortages along the production line due to tool trouble . . . all can shoot costs sky-high . . . make the difference between profit and loss.

Often it's just a matter of selecting the right tool and grade for the machining operation. When you specify Kennametal engineered tooling and the right grade of Kennametal,* you are giving your machines the BEST. You get consistent top performance at every step in your operations . . . from the first run through each regrind, insert after insert, tool after tool.

But be specific . . . specify the *exact* grade. A Kennametal Tool Engineer will gladly help you select the right grade for each operation. He works exclusively with Kennametal . . . applying and servicing it. He can show you reports of Kennametal's *consistent* repeat performance on all types of machining operations. KENNAMETAL INC., Latrobe, Pennsylvania.

KENNAMETAL* Grade Selection Guide makes grade selection quick . . . easy . . . positive

The Kennametal Grade Selection Guide groups Kennametal grades according to strength, hardness, and wear characteristics. For example, it pinpoints the new K21 as a medium grade ideal for general purpose steel-cutting. If greater edge-wear resistance is required and the job permits a harder grade, K4H would be the choice. If cratering is excessive, the choice would be to the left, or grade K3H. Thus, the guide offers a selection of high crater-resistant, intermediate and high edge-wear resistant grades at each hardness level.

PROVED BEST . . . TEST AFTER TEST

Grade K6 increased production of transmission drive gears to 70 from 25 by switch to 8-spindle, 20-tool operation.

Grade K3H machined up to 400 swivel joint flanges per grind, against previous top of 20.

MINING, METAL AND WOODWORKING TOOLS

WEAR AND HEAT-RESISTANT PARTS

INDUSTRY AND
KENNAMETAL
. . . Partners in Progress

ABRASION, CORROSION-RESISTANT PARTS

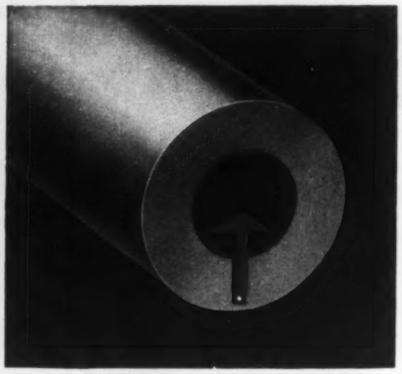
PERCUSSION AND IMPACT PARTS

*Registered Trademark

Give your machines the tools they deserve . . . the BEST

7298

a hole here costs money...



a hole here saves money

Crucible Hollow Tool Steel Bars put savings into the pockets of the metalworking industry. There's no need for costly drilling, boring, cutting-off or rough-facing operations. For the hole is already in the steel you buy. You save production time, machine capacity—avoid scrap losses.

Crucible Hollow Tool Steel Bars are now available in any of our famous tool steel grades . . . in almost any combination of O.D. and I.D. sizes. And you get *immediate* delivery of five popular grades — KETOS oil-hardening, SANDERSON water-hardening, AIRDI 150 high-carbon high-chromium, AIRKOOL air-hardening, and NU DIE V hot-work tool steels.

Your Crucible representative can show you how to save time and money with Crucible Hollow Tool Steel Bars. *Crucible Steel Company of America, Oliver Building, Pittsburgh 30, Pa.*

CRUCIBLE **first name in special purpose steels**

Crucible Steel Company of America

H. E. CONRAD
Executive Secretary, American Society of Tool Engineers, Detroit

FREDERICK S. BLACKALL JR.
President and Treas., Taft-Peirce Mfg. Co., Woonsocket, R. I.

are complex. They have their areas of effectiveness in cutting ferrous and nonferrous metals. With the recent introduction of cemented oxides, the user is provided with another tool material for use at considerably higher speed ranges to make the picture more complex.

Mr. Conrad . . .

There is every reason to expect the development pace will be accelerated. Last year saw intense competition and almost fantastic technological development. There is no indication of a letdown in this pace in 1956.

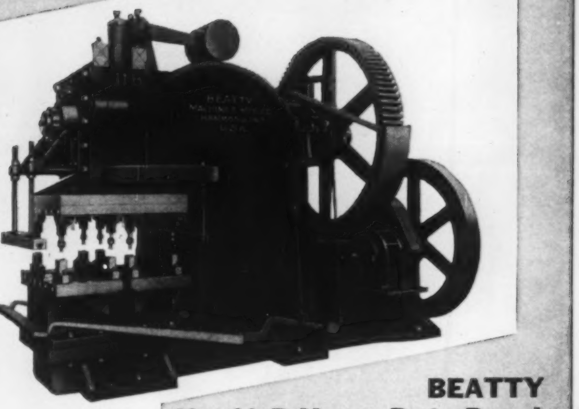
Keeping informed during this period of rapid technical expansion becomes increasingly difficult for industry's engineers. No longer is one man able to remain an expert in all phases of his chosen field. Indeed, new developments are coming about so rapidly that he is hard put in keeping informed in a particular specialty.

Recognizing these difficulties industry is depending more and more on the technical society to act as a focal point for technical information.

Mr. Blackall . . .

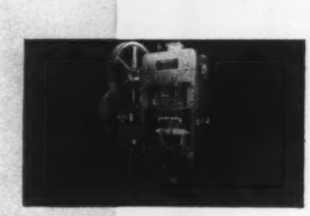
A rapidly growing trend is the inclusion of gaging operations in the machine tool cycle. The machine tool no longer can be defined merely as

FOR FASTER
HEAVY DUTY PUNCHING

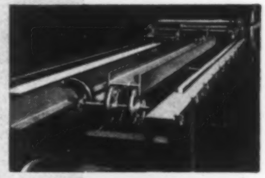


BEATTY
No. 11-B Heavy Duty Punch

HANDLES EVEN THE MOST COMPLICATED PUNCHING IN A SINGLE PASS



BEATTY Guillotine Beam Flange Punch for flange punching of beams. Built-in adjustable tools save set-up time. 200 ton cap.



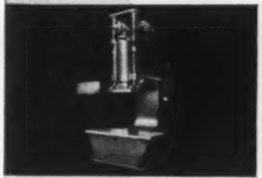
BEATTY Spacing Table handles web and flange punching without roll adjustment.

In less time, with less manpower, this BEATTY Heavy Duty Punch handles even the most complicated punching jobs . . . produces up to 34 patterns without a single tool change.

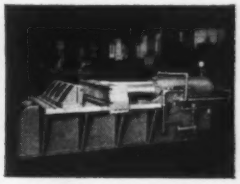
Used with the standard BEATTY Spacing Table, it accommodates steel shapes up to 65 ft. long and plates up to 42 in. wide. With exceptionally large die space, the machine can be tooled to the specific needs of the job—punches webs and flanges. Spacing of holes and slots is precise and practically automatic with the BEATTY Spacing Table.

In addition to increasing your output, this versatile unit reduces your labor costs. One operator and one helper are all the manpower required, and the machine is built for either right or left hand operation.

Consult a Beatty engineer for more information on a *job-engineered* BEATTY installation to fit your needs.



BEATTY Gap Type Press for forming, bending, flanging, pressing. 250 ton cap.



BEATTY Horizontal Hydraulic Bulldozer for heavy forming, flanging and bending.

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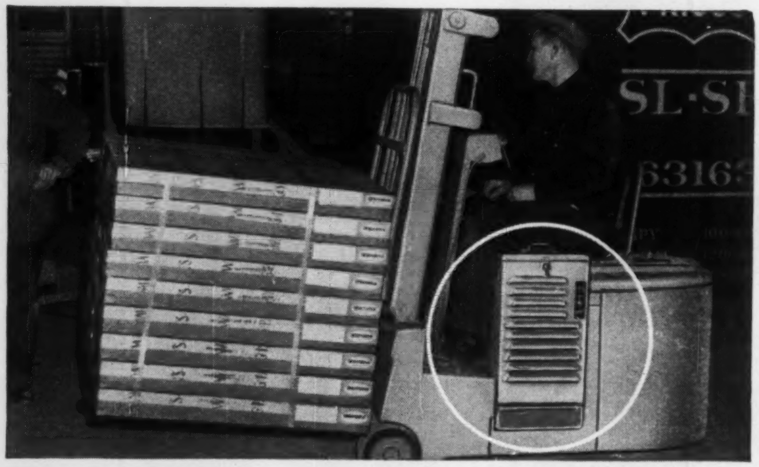
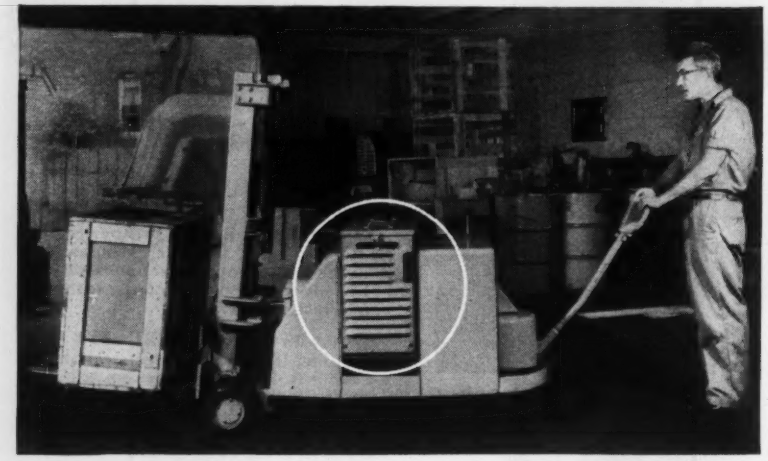


The Most Versatile Power Unit Ever Developed For Small Trucks

READY-POWER BANTAM MODEL W



Only the compact new Bantam Model W provides smooth, dependable gas-electric power that can be quickly interchanged from truck to truck.

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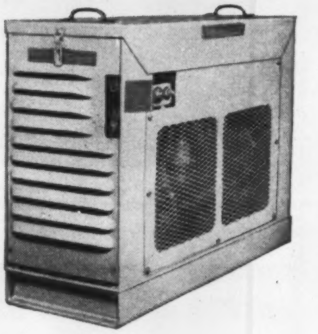

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Manufacturers of Gas and Diesel Engine-Driven Generators and Air Conditioning Units; Gas and Diesel-Electric Power Units for Industrial Trucks

W. B. DUNCAN
Chairman, Wesson Co.
Ferndale, Mich.

a "machine which removes metal in the form of chips." At the mass production level, it frequently loads, unloads, holds, transfers, removes metal, sets the tool and measures or gages the product.

Automation has even invaded the field of fixed gaging, with the growing use of power thread-gaging units, which speed up the process of inserting and withdrawing the thread plug in repetitive inspection operations.

Work simplification has engendered a renewed interest in the application of magnetic holding devices to operations other than grinding. Variations of the traditional magnetic chuck are demonstrating their versatility and their adaptability to automatic cycles on millers, planers, presses, brakes and many other machines, plus a wide variety of holding fixtures, layout tables, etc. An interesting modulation of an old theme is the use of magnetic drives on centerless grinding machines.

Mr. Duncan . . .

Productivity will increase more this year than in any single one since 1946 as more and more carbides are put to work.

Primarily, two reasons will account for a greatly expanded carbide market this year: There's an accelerated trend toward multiple tooling in an effort to combine multistation operations into a single machine and, if possible, into a single tool. The introduction of no-grind concepts in carbide cutting tool designs will put carbides to work on hundreds of jobs never done with carbide before.

The goals of combined operations in a single machine are being achieved,

Three cheers for the red, white and cool

The "see-through" safety guard was specially made for this photo only.

Distinctive RED blotter on a new WHITE wheel is the sign of COOL tool grinding worth cheering about! And that's not all…V40 Bond Tool Room Wheels by CARBORUNDUM cut faster, last longer and permit heavier infeeds without burning the stock or overheating the tool, even on die steels and hi-vanadium types. And the outstanding form-holding ability of V40 Bond Wheels eliminates costly stops for wheel dressing halfway through a job. Try one in your shop today. There's a type for every tool room operation…easily identified by the V40 on the bright red blotter. Your CARBORUNDUM Distributor or salesman will arrange a free demonstration. For Bulletin A-1310, write The Carborundum Company, Niagara Falls, New York. In Canada: Canadian Carborundum Company, Ltd., Niagara Falls, Ontario.

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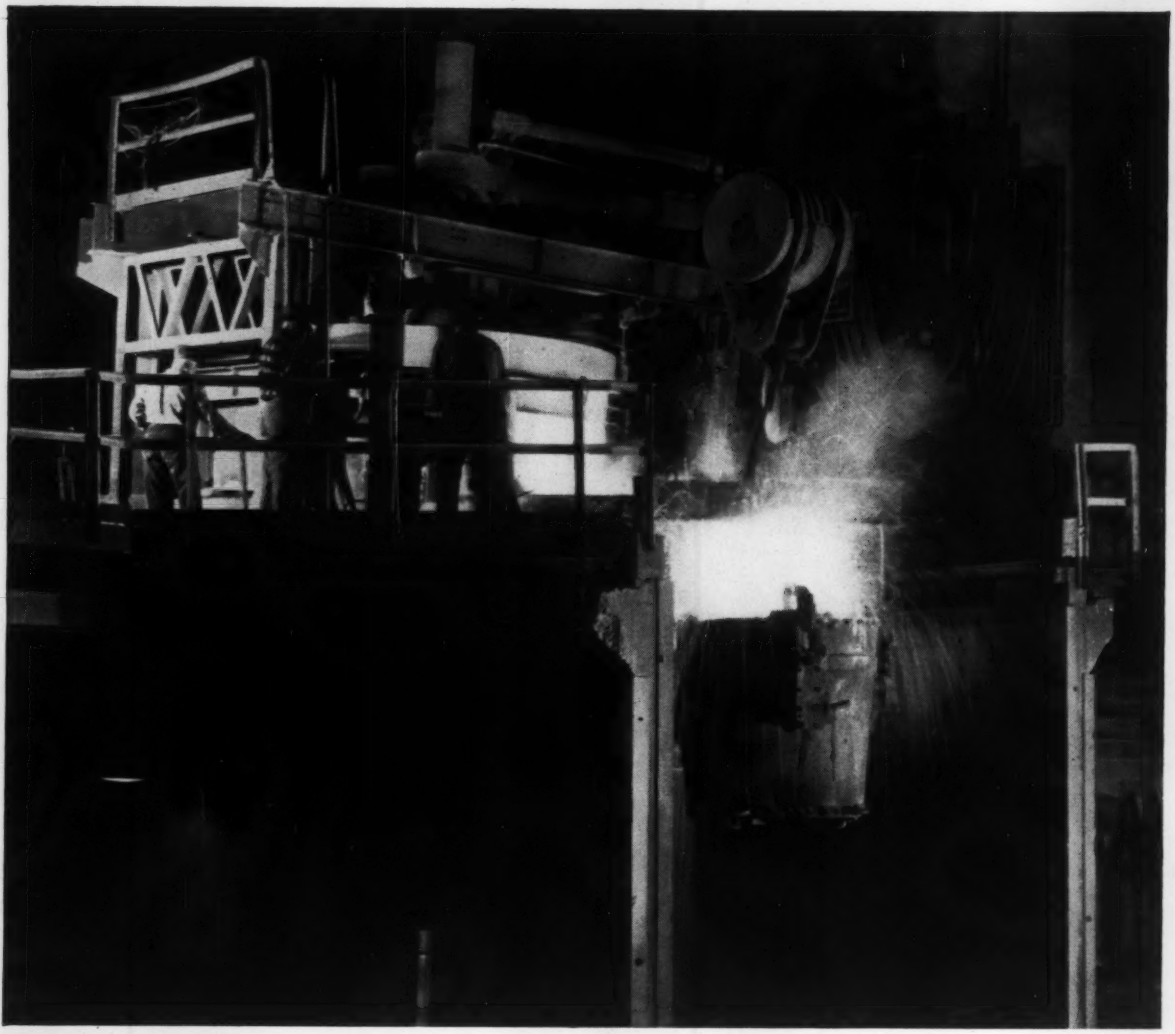
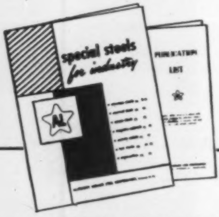


Can we pour a "cup" for you?



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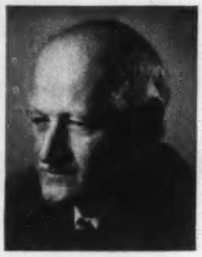


PHILIP M. McKENNA
President, Kennametal Inc.
Latrobe, Pa.

through carbides, by mass production plants to reduce costs and prevent rising wage scales from showing up in the cost of the end product.

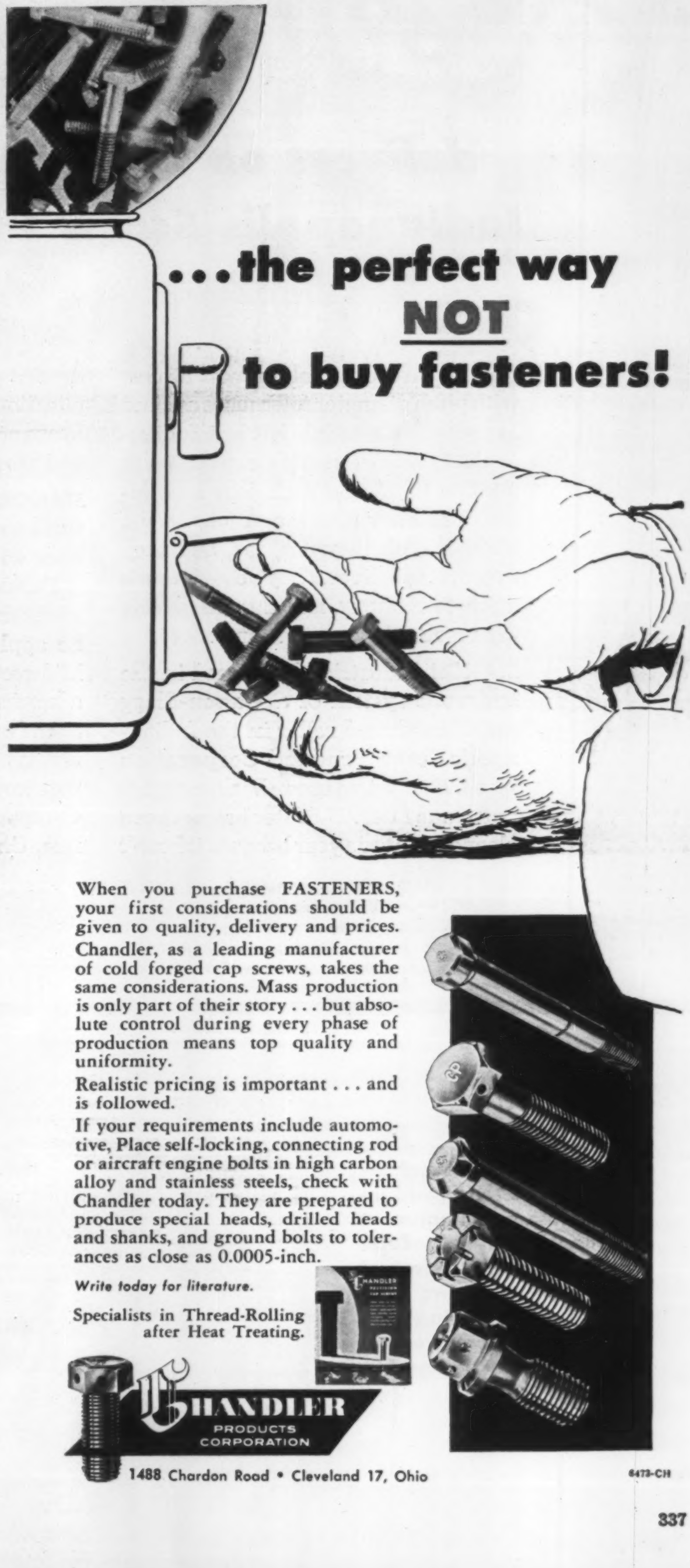
The new tool concepts will greatly expand carbide usage in small shops that have tooled exclusively with high-speed steel, and in the medium and large production segments of industry on machining operations being performed within confined dimensions, such as internal boring, facing and turning.

Mr. Mc Kenna . . .

Tungsten carbide metal should be used in increasing amounts in elements of construction. They'll resist wear at critical places in machines, and resist deformation where the bending of steel with a 30-million modulus is three times as great as with tungsten carbide alloys at 90 million. Boring bars, grinding quills, seal rings, pivots, journals, compression cylinders and pistons, valve seats and balls, or closures for valves at high pressures, hammer mills for comminution of coke and minerals, seats for tappets in engines and thousands of articles besides cutting tools will be made of carbide alloys in 1956 and 1957.

There is plenty of tungsten for a large advance in the use of tungsten carbide during the forseeable future. The misconception that a fundamental shortage threatened long-range expansion of uses is being corrected.

Costs of refining tungsten have increased, and the labor charge for making it into finished tool blanks is greater. But supplies of raw ma-



When you purchase FASTENERS, your first considerations should be given to quality, delivery and prices. Chandler, as a leading manufacturer of cold forged cap screws, takes the same considerations. Mass production is only part of their story . . . but absolute control during every phase of production means top quality and uniformity.

Realistic pricing is important . . . and is followed.

If your requirements include automotive, Place self-locking, connecting rod or aircraft engine bolts in high carbon alloy and stainless steels, check with Chandler today. They are prepared to produce special heads, drilled heads and shanks, and ground bolts to tolerances as close as 0.0005-inch.

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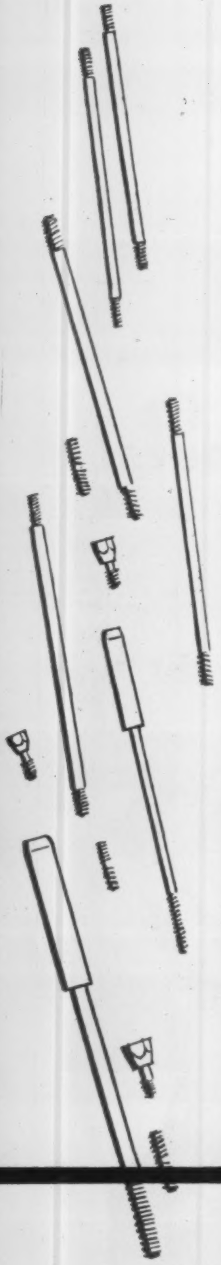
STANOIL ***Industrial Oil delivers on tough assignment at Indianapolis Screw Products Corp.***

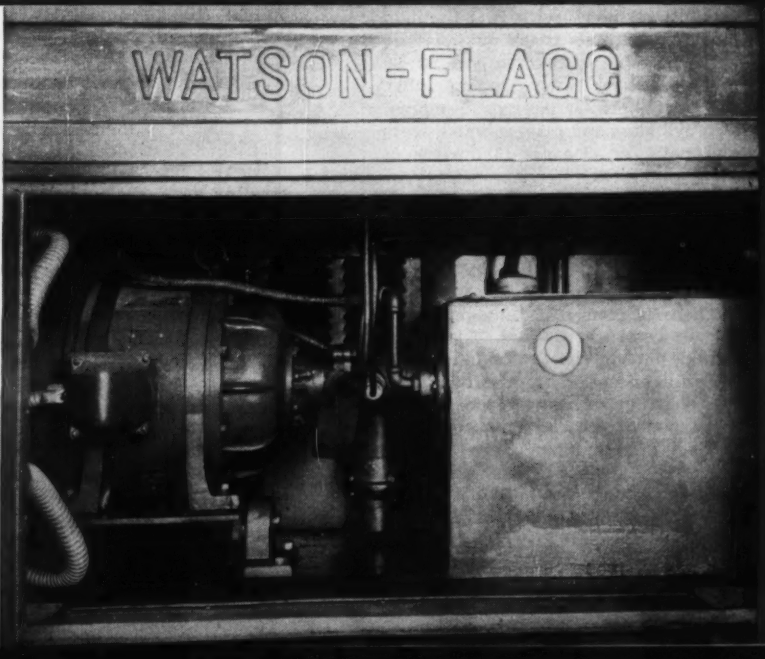


Rolling threads on aluminum bronze with pitch diameter tolerances as close as .0014″ is a tough job but Indianapolis Screw Products Corporation is used to taking on such jobs and delivering. They give tough jobs to the hydraulic oil they use, too, and they expect it to deliver. They've given such a job to STANOIL and they're getting the results they expect—and more.

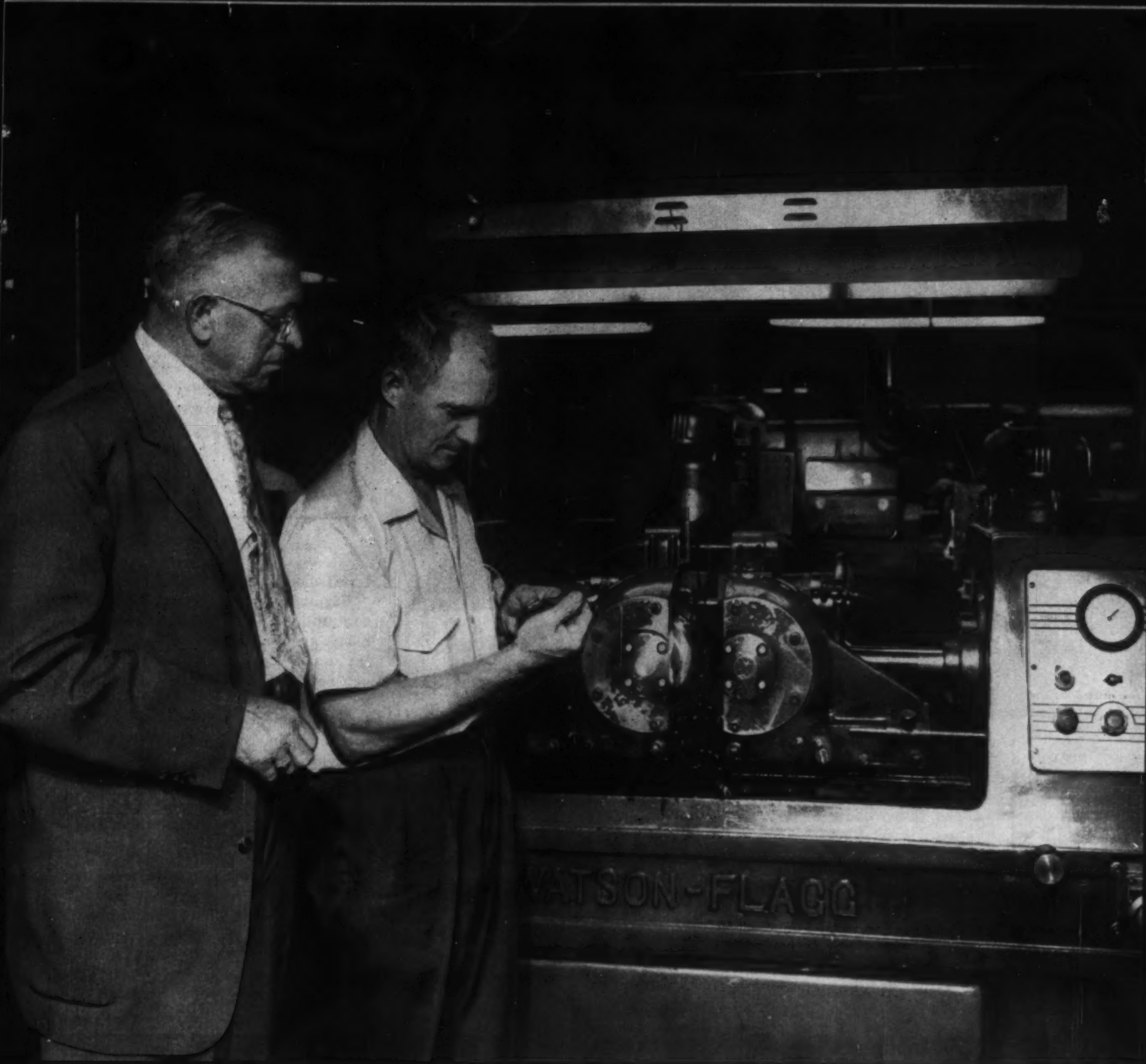
STANOIL Industrial Oil is used in the hydraulic system of a Watson-Flagg precision thread roller in the Indianapolis Screw Products Corporation plant. The system uses a Vickers pump and Cuno filter. The filter has not been cleaned in over a year *because it hasn't needed cleaning.* Here, as in other applications, STANOIL delivers top performance with minimum maintenance and maximum system cleanliness.

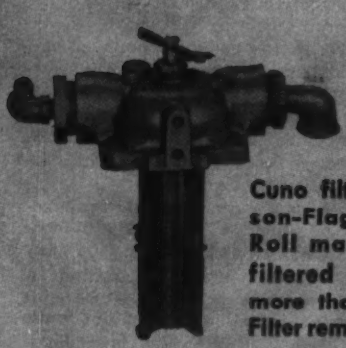
STANOIL likes tough assignments like this one; likes them because it can deliver with plenty to spare.

Perhaps you would like to know about the use of STANOIL in a hydraulic application in your plant. In the Midwest and Rocky Mountain states, a lubrication specialist at your nearby Standard Oil office will be happy to discuss it with you. Call him. Or, if you would like, contact Standard Oil Company, 910 South Michigan Avenue, Chicago 80, Illinois.



Tight gaskets, good maintenance, and STANOIL add up to first rate performance at Indianapolis Screw Products Corporation. This shot of Vickers pump shows how good housekeeping and STANOIL team for top operation on tough assignment.





Cuno filter in Watson-Flagg Thread Roll machine has filtered STANOIL more than a year. Filter remains clean.

Mr. R. W. Williams, Plant Superintendent, checks pitch diameter of thread with Glenn Riggs, Standard lubrication specialist. Glenn Riggs is an old hand at helping industrial firms work out lubrication problems. Glenn has been doing this sort of thing for 28 of the 30 years he's been with Standard. This background and experience, customers have found, pay off for them.

STANDARD

STANDARD OIL COMPANY
(Indiana)

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- **ON MAGNESIUM** Iridite provides a highly protective film in deepening shades of brown. No boiling, elaborate cleaning or long immersions.

AND IRIDITE IS EASY TO APPLY. Goes on at room temperature by dip, brush or spray. No electrolysis. No special equipment. No exhausts. No specially trained operators. Single dip for basic coatings. Double dip for dye colors. The protective Iridite coating is not a superimposed film, cannot flake, chip or peel.

WANT TO KNOW MORE? We'll gladly treat samples or send you complete data. Write direct or call in your Iridite Field Engineer. He's listed under "Plating Supplies" in your classified telephone book.

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E. K. WHEAT
Supervisor, Process Research Section
Remington Arms Co. Inc., Ilion, N. Y.

terial should be abundant.

High-speed steel of the 18:4:1 type, containing 18 per cent tungsten, has been largely replaced by steels containing 6 per cent tungsten and 6 per cent molybdenum. This has led to a disparity between relatively large supplies of tungsten and the consumption. A host of the metal is being stockpiled.

Mr. Wheat . . .

Carbide throw-away inserts may one day be changed automatically when they get dull. The feed-back principle may be used to indicate when the end point is reached for efficient cutting. However, this information now depends on somewhat indefinite data and is usually planned on the basis of experience. The wear land on the cutting edge is not something that can be fully controlled or corrected while in use.

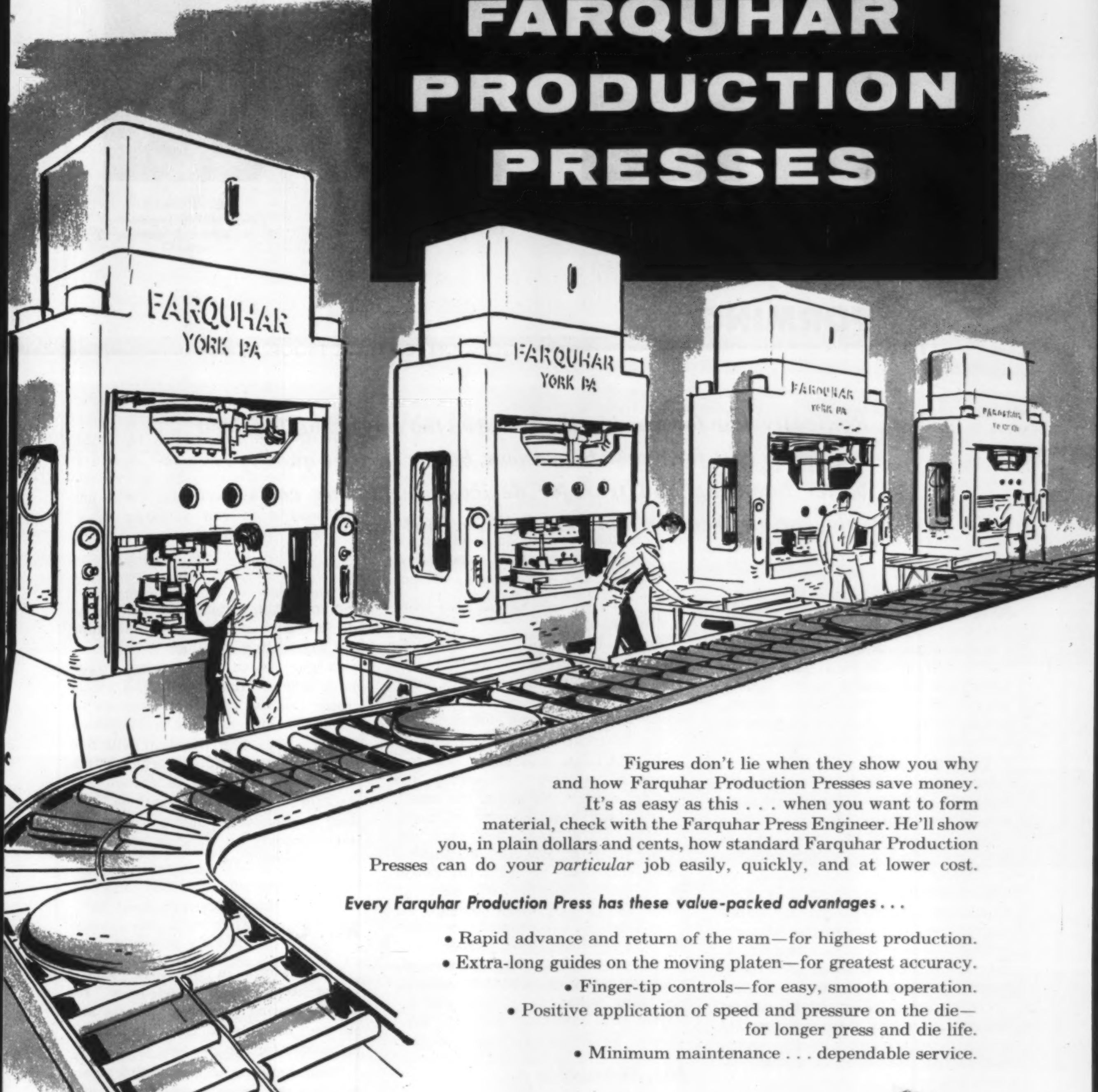
More emphasis will have to be placed on the basic elements of machinability, so the automation concept can be advanced. Measures of tool control have been used by rating tool life on the number of pieces expected between regrinds as determined by experience.

It is evident that the least productive or shortest life tool still controls the over-all capacity of any mechanized machining operation. A whole machine or line must be shut down or a station blocked out while the least productive tool is replaced or the tool group changed. We must expect cutting tools to have even greater flexibility in setup, changeover and universal use.

Machinability must be considered the controlling factor for further enhancement of automation.

Figure your saving with

FARQUHAR PRODUCTION PRESSES



Figures don't lie when they show you why and how Farquhar Production Presses save money. It's as easy as this . . . when you want to form material, check with the Farquhar Press Engineer. He'll show you, in plain dollars and cents, how standard Farquhar Production Presses can do your *particular* job easily, quickly, and at lower cost.

Every Farquhar Production Press has these value-packed advantages . . .

- Rapid advance and return of the ram—for highest production.
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- Finger-tip controls—for easy, smooth operation.
- Positive application of speed and pressure on the die—for longer press and die life.
- Minimum maintenance . . . dependable service.

Get the facts on Farquhar Production Presses . . . send for catalog describing the basic sizes and types of Farquhar Presses. Write: A. B. Farquhar Division, The Oliver Corporation, Press Dept., York 51, Penna.

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President
Northern Metal Products Co.
Franklin Park, Ill.

WALDEMAR NAUJOKS
Drop Forging Association
Lansing, Mich.

E. V. CRANE
Chief, Special Engineering
E. W. Bliss Co., Canton, O.

FORMING

FORUM ON TECHNICAL PROGRESS

Radically new forming methods are on the way . . . high-priced materials call for closer tolerances, better surface quality . . . better handling and transfer devices are cutting costs . . . lubrication becomes more critical in cold forming . . .

Mr. Schaefer . . .

Demand for large open-die forgings will continue into 1956 on the high level it reached in the closing months of 1955. Coupled with the increased use of such forgings is an intensive interest in their unique properties.

We expect to witness unusual activity in research, experimentation and development of forgings in 1956—their properties, the importance of hydrogen content, the possible use of different alloy combinations, the improvement to be expected by more drastic heat treatment operations (including liquid quenching of quite large sections) and the standardization of ultrasonic inspection techniques and acceptance levels.

The objects: To extend the use of forgings, to utilize to an even greater extent their reliability in the severe applications demanded by modern engineering.

Mr. Caditz . . .

There will be a continued trend toward reducing costs through mechanization and improvements in materials handling. The tremendous effort made to reduce indirect labor costs has been reflected in lower prices. However, competition in cost alone is not all that will be required from the industry.

Patterned thinking with blind acceptance of such words as "integration" and "diversification" leads many end-product manufacturers to unsound make-it-yourself decisions.

The contract stamper has specialized knowledge and skills; he furnishes a valuable engineering and costing service; he takes the small, intermittent requirements of many manufacturers, and adds them together into a constant economical production flow; he turns the faucet on or off on any specific part—all these things can mean savings for almost every end-product manufacturer in our production economy.

The contract stamping industry has a selling job to do in 1956 in pointing out those facts.

Mr. Naujoks . . .

Serious consideration will be given to minimizing or eliminating scale on heated forging stock (for automotive, commercial and aircraft forgings) by the use of new type and improved forge heating furnaces. Efforts will be made to improve the original design of components to be forged, to attain the best balance of service strength and forging economy. Improved processing techniques and inspection procedures will be an aid in reducing the cost of machining and assembling forgings.

Larger closed die forging equipment now available will tend to increase the use of larger forgings on industrial and aircraft applications. Newer alloys like titanium will find further application in forged parts. Many regular grades of carbon and structural alloy compositions will find a broader application through improvements in forging and heat treating practices.

Mr. Crane . . .

Test results in the wide plastic range are grossly inadequate for manufacturing purposes. Charts and curves, not abstractions in higher mathematics, are needed.

What happens to stress and strain between the annealed yield point and the severely work hardened states? How can such information be best expressed so that it is easily applied to the figuring and planning of operations?

The low range in which metal is moved slightly beyond its yield point and may return to its original physical properties is still inadequately understood. The high range reached in the compression operations of wire

E. K. MORGAN
Director of European Operations
Danly Machine Specialties Inc.
Chicago

CARTER C. HIGGINS
President, Worcester Pressed
Steel Co., Worcester, Mass.

C. H. SMITH JR.
President
Steel Improvement & Forge Co.
Cleveland

H. F. DEVENS
Sales Manager—Roll-Bond, Metals
Div., Olin Mathieson Chemical Corp.
East Alton, Ill.

drawing, cold extrusion, cold forging and cold rolling has been partially explored. The great need covers the wide range of normal press and rolling operations. Test methods still require patience but have been sufficiently worked out.

The plastic working of heat-treated steels and other materials has been used enough to whet our appetites for more information.

Mr. Morgan . . .

Among trends: 1. Greater use of progressive and transfer feed dies for parts that are well standardized. 2. Use of separate presses with shuttle-type transfers for lower production products, or products subject to yearly restyling. This spells automation and a lower labor cost—but an increase of capital investment.

Press users are demanding better and more versatile equipment. Following are some of the features that are becoming a must:

1. Automatic lubrication (of the recirculating type) to give greater economy, as well as trouble-free operation.
2. Built-in electric, air and automation controls completely housed in the press frames.
3. An inching device that can be used when setting up dies, spotting dies and to produce a sample part.
4. A positive and simple method of varying the relation of the draw speed with respect to the over-all speed of the press for better handling of variations in material and product.
5. Greater versatility and safer operation.

Mr. Higgins . . .

The stamping industry looks for further expansion. The majority have bought new equipment, frequently of specifications which differ from those of older machines. Developments in automatic transfer between presses are being observed. Large orders are needed to amortize transfer equipment, but few buyers are ready to assure over a year's operation of such equipment, there is no marked trend toward automatic transfer.

The industry has unfilled capacity, and every effort is being made to reduce costs—so that stampers can get their share of the business, so that it will not pay stamping buyers to make their own. More attention is being paid to stamping redesign, less expensive packaging and close overhead control.

There are a number of instances of improved secondary operations, such as induction annealing and brazing, better machining and finishing. More equipment is being bought to improve materials handling, to make presses mobile, to apply lubricants, etc. Several stampers are investigating vacuum forming of plastics.

Mr. Smith . . .

The rapid increase in the use of titanium and other high-priced materials has given rise to a new concept in the design of aircraft forgings. Greater emphasis is being placed on the saving of material in component parts at the expense of machine time and man-hours. This results in forging designs calling for far closer tolerances, minimum or no draft and for better control of surface quality.

High strength steel, heat-treated to obtain tensile strengths in a range of 280,000 to 300,000 psi, will greatly increase in the year ahead. It is already finding rapid expansion in aircraft landing gear.

The drop forging industry goes into 1956 with larger backlogs than at any time in the last several years. Industries that have been traditional users of forgings indicate increased rates of production in 1956, which should keep the drop forging industry operating at a high level. Prices of drop forgings will increase over the year to absorb the inevitable cost increase as raw material prices and labor rates increase.

Mr. Devens . . .

Tooling has become a large factor of total costs, especially where initial expense can be spread over only a moderate number of pieces. There is increasing incentive to find ways to form metal with a minimum of tool and die work.

Developments, such as Kirksite dies, plastic dies, Hydroforming, stretch forming and explosion forming are examples of the results of the ever broadening search for improvements and cost reduction. The art of roll bonding metals has been refined to include the hydraulic inflation of a pattern of interconnecting tubes within the homogeneous sheet of metal. Eliminated is the die work to form up such tubes in two sheets of metal which are brazed together.

Equally revolutionary developments

RICHARD A. POWLEY
General Manufacturing Mgr.
Aircraft Engine Div.
Ford Motor Co., Chicago

NIEL VAN DEUSEN
Sales Manager, V & O Press Co.,
Div., Emhart Mfg. Co., Hudson, N.Y.

WILLIAM DOLLE
President
Lodge & Shipley Co., Cincinnati

J. F. LELAND
Assistant Sales Manager
Parker Rust Proof Co., Detroit

RICHARD B. STRIBLEY
Manager, Phosphate Coating Division, Detrex Corp., Detroit

are on the way. Companies in the metal forming business that do not keep well abreast of such developments will not be competitive.

Mr. Powley . . .

Material conservation and cost reduction have focused attention on roll forming as a method of producing circular parts for modern jet engines. Machining these parts from heavy forgings or intricate weldments resulted in many man-hours spent in removing metal with cutting tools.

For example, one finished part, which weighs 10.78 lb, was machined from a forging weighing 83 lb. It is roll formed from a forged blank weighing 28 lb.

This is further emphasized by the greatly increased cost of new materials, such as titanium, which costs 31 times as much as stainless steel in forging form and has a low scrap reclaim value.

An important move in this direction is the development of a vertical-spindle, heavy-duty, twin-roller machine to handle the roll forming of heavy rough blanks into the larger circular components of jet engines.

Mr. Van Deusen . . .

The press is being called upon more to perform operations once considered outside its sphere. Such functions as materials handling, assembly and quality control inspection will be done automatically on a single press.

Serving as the nerve center of production systems, in some plants the equipped press will turn out more goods at higher speeds than ever before. In others, the use of less expensive stock made possible by improved tooling design, the freeing of valuable floor space or reduced labor costs will bring new economies.

At the same time, improved press tooling and automatic feeds will bring still greater precision to machine-made goods, reflecting the more selective buying by the ultimate consumer.

Mr. Dolle . . .

The future of metalworking will include a vast development in "chipless" production where intricate parts will be produced at low cost. For example, a radically new metal forming method axially cold flows simple blanks into complicated shapes. Tooling is low cost, easily and quickly obtained, and production is rapid.

The method reduces raw material weight by virtually eliminating waste; it cuts machining, welding, preliminary and subsequent forming operations and reduces inspection cost.

It is easy to see continuing growth in the use of strip and sheet and the accompanying wider use of press brakes and shears. A shear with variable rake is in the future. It will practically eliminate distortion in cutting sheet metal. Hold-down systems are being developed that will not mar or dent the most highly polished metal. Press brakes will become more versatile and easy to operate.

Mr. Leland . . .

One large press manufacturer has installed facilities at a reported cost of $750,000 to develop cold extrusion jobs. Inquiries and development contracts, after a few months of operation, are already taxing his facilities. In some plants, whole banks of screw machines have been retired. In their place are a few fast acting presses producing 40 to 60 cold extruded parts per minute to finish tolerances with no loss of metal.

The role played by lubrication is more critical than anticipated by early investigators. Because of the increasingly severe cold working being attempted, the necessity for quality phosphate coatings has increased. With proper design of tooling and the best in lubrication, tool life is being measured in the hundreds of thousands of parts. It has come to the point where every shop having items capable of being manufactured by cold extrusion must investigate this procedure and apply it where possible to remain competitive.

Mr. Stribley . . .

Bumper manufacturers have been able to meet increased production schedules by using special cleaners, a special phosphate coating and a high quality, compatible drawing lubricant, even though designs are more complex. Some have even been able to meet accelerated schedules without overtime.

The new process has permitted a reduction of die tolerances, with a subsequent increase in the depth of vertical stretch without wrinkling. Straight line hand buffing was eliminated, as there was no longer any scratching of the metal in forming.

Maintenance time for the coating tanks has been cut about two-thirds.

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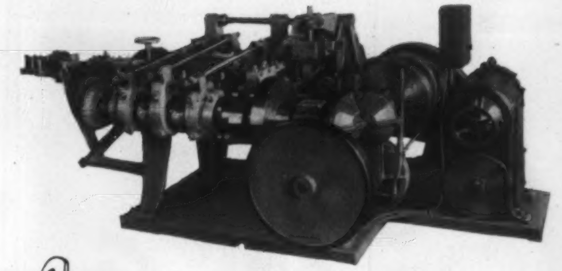

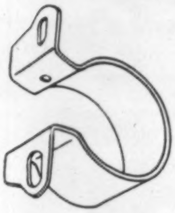

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Features Built-In Crank Press

Feed capacities: 8, 10, and 15 inches
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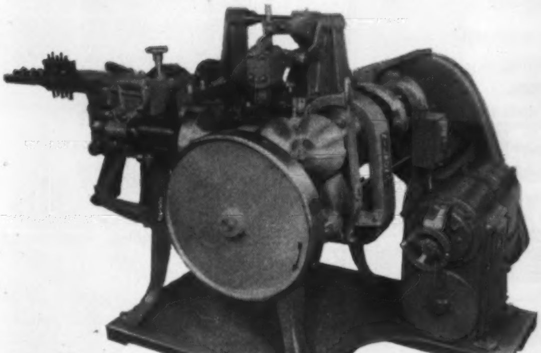
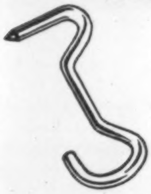
Stroke of press: ¾, ⅞, 1, and 1¼ inches
Net weights: 2560 to 9700 lbs.

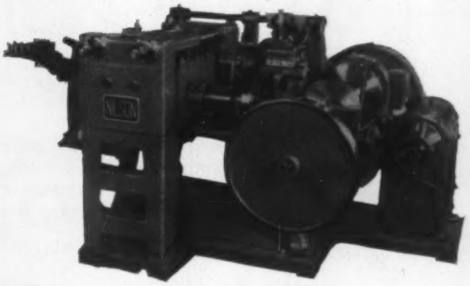


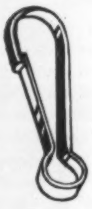


FOUR-SLIDE WIRE FORMING MACHINES

Built In 10 Models—Rated By Wire Capacity—Will Form Ribbon Metal Also

Wire diameters formed: approx. 1/64 through ½ inch
Feed lengths available: from 3 to 32 inches
Net weights: from 600 to 18,500 lbs.





HEAVY DUTY COMBINATION FOUR-SLIDE MACHINES

Available in 2 Models.
Features Built-In Toggle Press

Press capacities: 50 and 75 tons
Max. feed lengths: 11½ and 16 inches
Max. width of stock: 2 and 2½ inches
Stroke of press slide: 2 and 2½ inches
Net weights: 9535 to 12,700 lbs.

NILSON 4 - SLIDES FEATURE —

1 **AUTOMATIC OPERATION**
From coil to final formed part.
One man can operate 3 or 4 machines.

2 **INCREASED PRODUCTION**
50 to 400 pieces per minute depending on size.

3 **NO SECONDARY HANDLING**
Straightening, cutting off, stamping and forming all in one operation.

4 **IMPROVED PRODUCTS**
Closer control and precision in stamping and forming parts assures uniformity.

5 **LOWEST INITIAL COST**
Choice of 16 models for efficiency and economy.

Nilson engineers are always available for consultation on forming problems. Bulletin #61 sent on request.

Nilson's 3 tilt reels and 3 stationary models handle wire or ribbon stock coils up to 500 lbs.

A.H. NILSON MACHINE COMPANY

1512 RAILROAD AVENUE, BRIDGEPORT 5, CONN.

Automatic Chain Making Machines • Staple Forming Machines • Wire and Stock Reels • Wire Straightening Equipment • Slide Feeds for Presses • Wire and Ribbon Stock Forming Machines

RENT OR BUY
SILENT HOIST
LIFTRUK
on the
"DAY-BY-DAY
EARN-ITS-WAY
PLAN"

3-5-7½-10-15 ton
CAPACITIES

If you can reasonably use a Heavy Duty LIFTRUK for at least two hours a day average, to improve the movement of goods in process or reduce materials handling operations, then you should be interested in this unusual "rent-or-pay-as-you-use" plan. Proper cost accounting methods often show that man-hours saved, storage space gained, or time in transit reduced, add up to a profit well above the payments required for LIFTRUK for purchase or rental charges.

Exclusive
FLUID
DRIVE

Write for "Earn-Its-Way" Plan to

SILENT HOIST & CRANE CO.
Pioneer Mfrs. of Heavy Duty Materials-Handling Equipment
849 63rd Street, Brooklyn 20, N Y

Another of the Reasons Behind Brad Foote Quality—

TOOTH SPACING

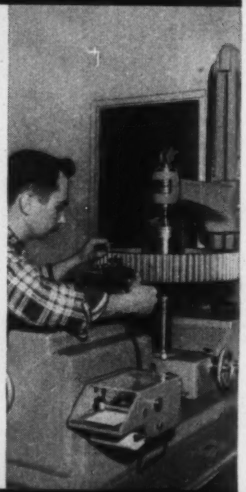
• 99% of gear drawings do not specify tooth spacing. For most applications, industry generally believes that competent gear manufacturers, working by standard AGMA practices, will produce gears within the limitations required for easy assembly and good load transmission.

• Occasionally, however, on very precise jobs you may find it necessary to specify extreme accuracy of tooth spacing and nonadjacent tooth spacing. Applications such as radar mounts, timing mechanisms, indexing mechanisms—all may require closer tooth spacing tolerances than are obtainable with average equipment in the hands of regular gear manufacturers.

• BRAD FOOTE welcomes precision jobs like these. We can add to highly specialized equipment specific experience in meeting this, as well as many other demanding requirements for special gear production.

• Prove to yourselves the savings that BRAD FOOTE quality can mean. Let us quote on the gear requirements for your next program.

BRAD FOOTE MAKES ALL TYPES OF GEARS—
IN A COMPLETE RANGE OF STYLES AND SIZES



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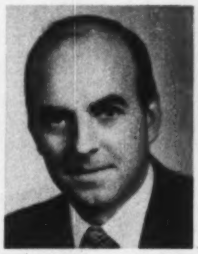
Bishop 2-1070 • OLympic 2-7700 • TWX CIC 2856-U

subsidiaries
AMERICAN GEAR & MFG. CO.
Lemont, Illinois Phone Lemont 920
PITTSBURGH GEAR COMPANY
Phone SPalding 1-4600 Pittsburgh 25, Penn.



BYRON B. BELDEN
Application Engineer, Hydraulic
Press & Power Tool Div.
Baldwin-Lima-Hamilton Corp.
Eddystone Div., Philadelphia

JOSEPH J. DUFFY
Manager, Metal Processing
Chemical Dept., Pennsylvania Salt
Mfg. Co., Philadelphia

Die maintenance has been reduced by about 50 per cent. Multiple draws, previously difficult, are done with ease.

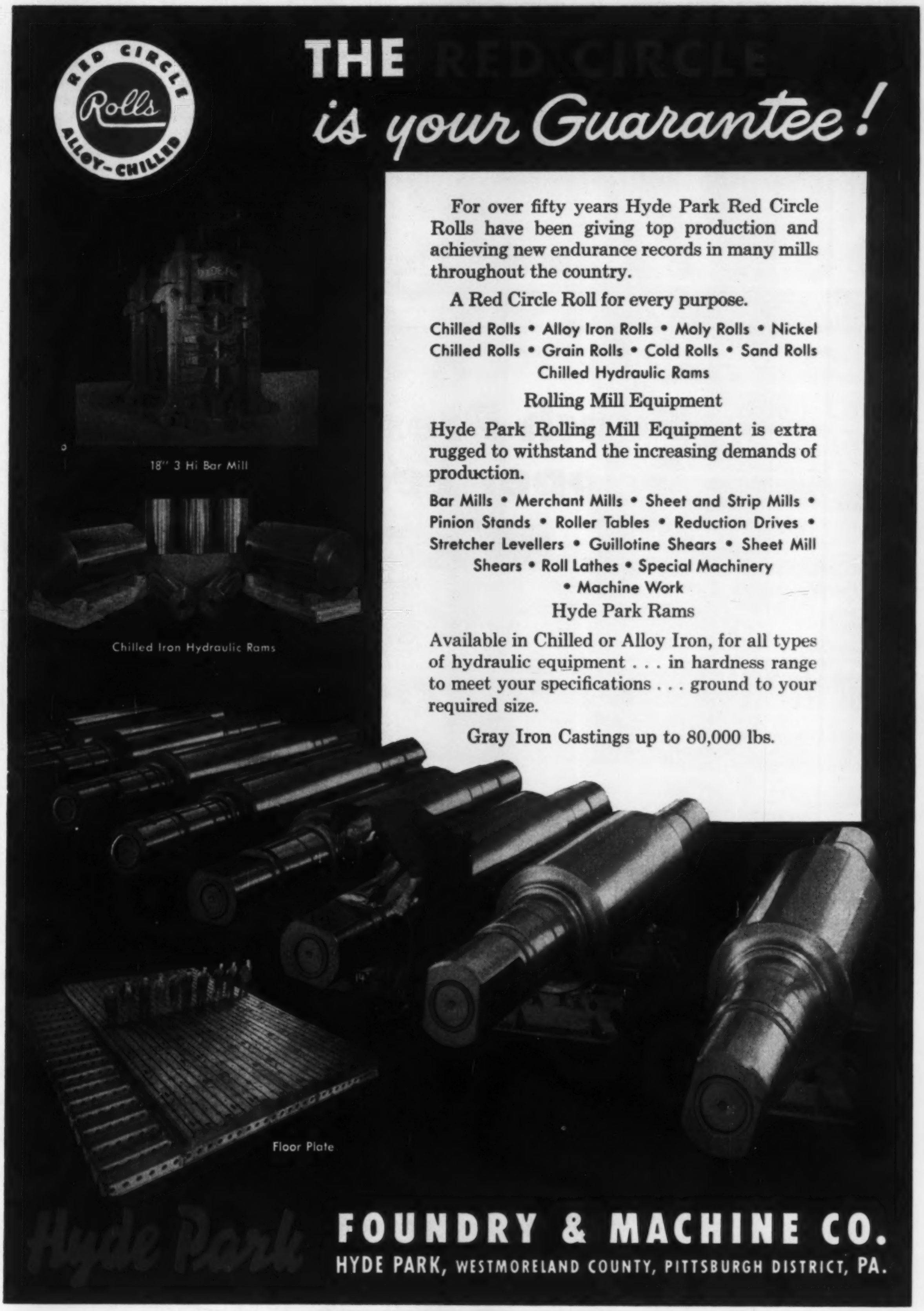
Mr. Belden . . .

The size barrier for complex metal powder parts has just been broken by the development of a 300-ton, multiple-motion, hydraulic compacting press. It is the first of its kind having a floating die holder, floating core rod support, stationary core rod support and provision for mounting an inner and outer top punch.

It is possible to compact parts that have a flange in the center, counterbored holes and through holes. Another example would be double counterbored parts, with offset of flanged sections on the outside. Previously, parts of this type required complex die sets or extensive secondary machining.

Mr. Duffy . . .

In the automotive industry, there is increased interest in quality finishes. For example, the damage caused by flying pebbles must be lessened. This promotes interest in the modifications of zinc-phosphate coatings. Considerable development work will be done to improve the



THE RED CIRCLE
is your Guarantee!

For over fifty years Hyde Park Red Circle Rolls have been giving top production and achieving new endurance records in many mills throughout the country.

A Red Circle Roll for every purpose.

Chilled Rolls • Alloy Iron Rolls • Moly Rolls • Nickel Chilled Rolls • Grain Rolls • Cold Rolls • Sand Rolls Chilled Hydraulic Rams

Rolling Mill Equipment

Hyde Park Rolling Mill Equipment is extra rugged to withstand the increasing demands of production.

Bar Mills • Merchant Mills • Sheet and Strip Mills • Pinion Stands • Roller Tables • Reduction Drives • Stretcher Levellers • Guillotine Shears • Sheet Mill Shears • Roll Lathes • Special Machinery • Machine Work

Hyde Park Rams

Available in Chilled or Alloy Iron, for all types of hydraulic equipment . . . in hardness range to meet your specifications . . . ground to your required size.

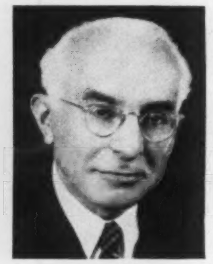
Gray Iron Castings up to 80,000 lbs.

Hyde Park **FOUNDRY & MACHINE CO.**

HYDE PARK, WESTMORELAND COUNTY, PITTSBURGH DISTRICT, PA.

quality and consistency of the phosphate system itself and the preparation cycles.

In cold extrusion, the trend is toward the use of thinner, better-quality, zinc-phosphate coatings with improved lubricants. There is a continual trend toward the more easily controlled baths. Dry-soap-film-type lubricants face an expanding field with the increased demand for better drawing lubricants which can be easily removed.



DAVID C. VERSON
President
Verson Allsteel Press Co., Chicago

J. E. HAWKING
Sales Manager, Pines Engineering Co. Inc., Aurora, Ill.

Mr. Verson . . .

Under the pressure of competition, better and more economical methods of producing metal parts will continue to be developed. The tremendous growth in transfer feed forming is typical. Present limitations will be pushed back and the process extended to many new parts—even to such operations as forging.

Parts being formed are becoming increasingly complex; the number of operations that can be performed is multiplying. A good example of this is a recent Transmat press. It performs eight operations on a large part, and, consequently, requires a press too wide for a conventional design. The problem was solved by designing the press with two slides in series.

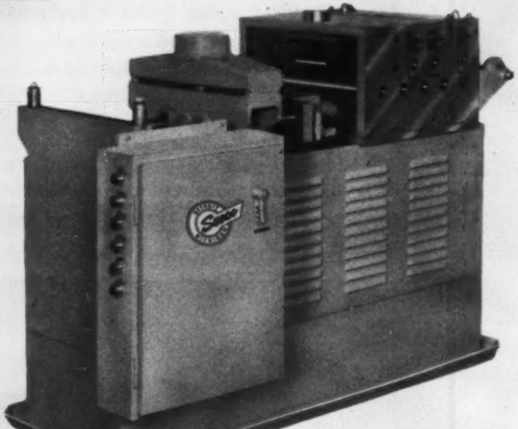
Significant is growing acceptance of the idea that buying a press is not enough. Today, you buy a production process.

Mr. Hawking . . .

Use of modern forming operations instead of expensive metal removal is a sure source of cost reduction. The modern tube bender has grown into a precision production tool.

Rolled sections of steel (including stainless), aluminum extrusions and bars of round, square or irregular shape are being bent on tube bending machines which were used only for pipe and tubing. Metalworking plants are finding the tube bender ideal for forming. It offers speed, extreme accuracy, low initial cost, low tooling cost, amazing versatility and quick tool change.

The tube bender lends itself to automatic operation when production quantities justify single - purpose equipment. Machines that feed small-diameter copper and aluminum tubes from coils, straighten, bend, cut and eject completed pieces in a single, automatic operation will be in production this year.



Sesco Punch Press Gripper Feed

AMAZING ACCURACY

ELIMINATES MISFEEDING

INCREASES PRODUCTION

PINCH GRIPPING ASSURES SCUFF-FREE FEEDING

May be attached to your new or present equipment without alteration or re-work of your punch presses. The unit is adaptable to feed from the left, right, front or back. All of the feeding takes place on the upstroke of the press. Models are available to handle stock up to 48" in width and 36" in stroke. This Unit is positive, accurate and reliable.

For Complete Pressroom Automation

Write for Catalog

Sesco INC.
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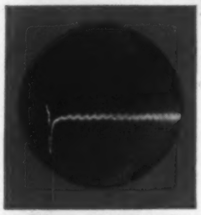
engineers & manufacturers of machine tools and press room equipment

VICKERS® Controlarc DC Arc Welder Survives Punishing "Durability Test"

VICKERS
Controlarc
300 DC Welder

OVER 1,000,000 CYCLE HIGH-SPEED REPETITIVE ARC TACK TEST EQUIVALENT TO MORE THAN TWO YEARS OF CONTINUOUS USE



This unretouched oscilloscope photograph shows the voltage trace occurring when the arc was broken very quickly during the test, subjecting the CONTROLARC welder to severe abuse.

"How much punishment can the Vickers CONTROLARC DC Welder take?"

Vickers engineers decided to find out.

A 200-ampere CONTROLARC was subjected to a gruelling durability test. Every nine seconds the welder was charged with a six-second load of 250 amperes (50 amperes above rated capacity) at 27.5 volts. After 198,900 "makes" and "breaks" the load was boosted to 300 amperes at 27 volts. When the test was concluded the CONTROLARC had survived 1,004,522 of these charges, *and was still going strong*—with no apparent effect on any part of the welder. This test simulated arc tacking on production at 4 tacks continuously per minute on an 8-hour day basis for over two 300-day years.

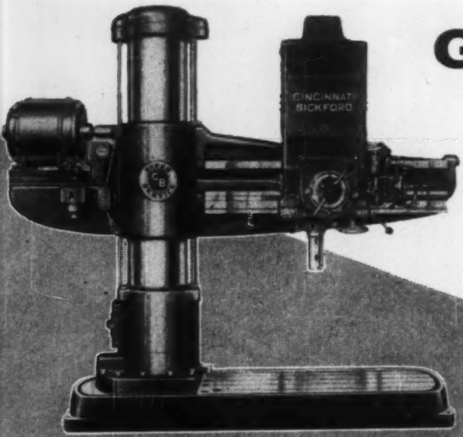
For complete information about this rugged, dependable welder, write today for new bulletin.

Some territories open for Qualified dealers. Write for details.

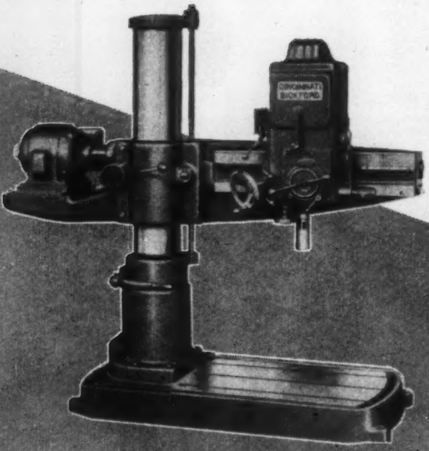
VICKERS ELECTRIC DIVISION

VICKERS Inc. a unit of Sperry Rand Corporation
1859 LOCUST STREET • SAINT LOUIS 3, MISSOURI

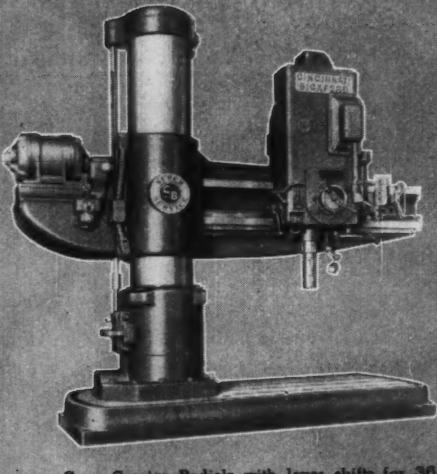
Get "Super Service" a CINCINNATI



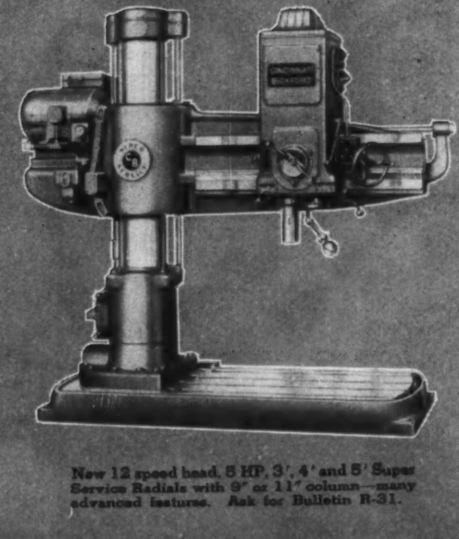
New design 3′ to 8′ Super Service Radials, 11″ to 19″ diameter columns with hydraulic speed range pre-selector. Write for Bulletin R-32.



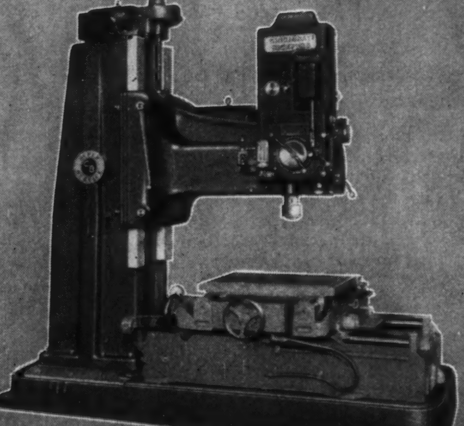
3′ and 4′ arm, 9″ column, 3 HP Super Service Radials for fast easy handling. Write for Circular R-21C.



Super-Service Radials with lever shifts for 36 speeds and 18 feeds, 3′ 11″ to 8′ 19″ sizes. Ask for Booklet R-29.



New 12 speed head, 5 HP, 3′, 4′ and 5′ Super Service Radials with 9″ or 11″ column—many advanced features. Ask for Bulletin R-31.



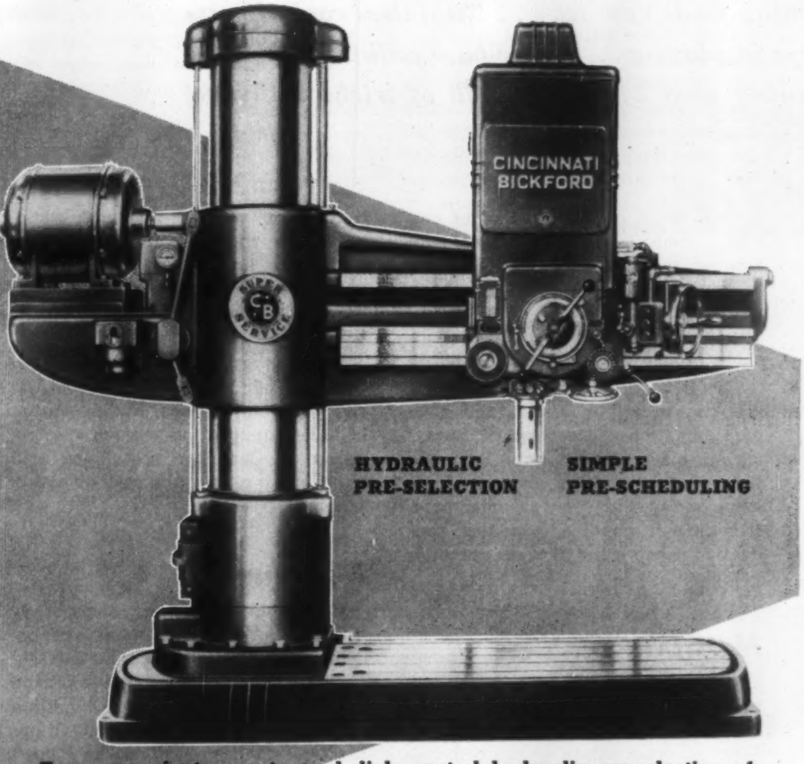
Super-Service Precision Drilling Machine used with spacing table, for interchangeable production without jigs—Bulletin FH-2.

CINCINNATI
BICKFORD

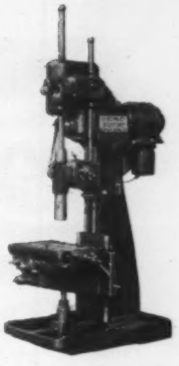
in your shop with

BICKFORD . . .

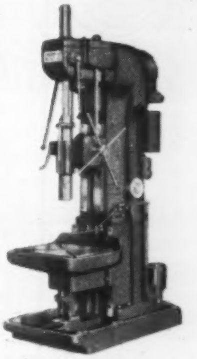
This complete Super Service line of radial and upright drills offers a wide opportunity for profitable selection to fit your individual needs. These latest designs in modern drilling machines for economical production are backed by 81 years of leadership in the metal drilling field.



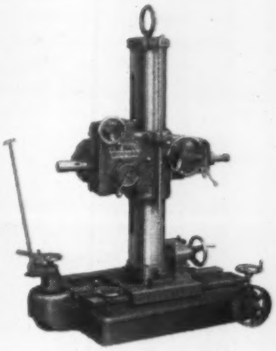
Two convenient easy to read dials control hydraulic pre-selection of all 36 speeds and 18 feeds. Pre-scheduling of operations (with a permanent record) is simple and quick. 4' 13" to 8' 19" sizes — Booklet R-33.



21", 24" and 28" sizes, 3 HP to 7½ HP, general purpose Upright Drills, round or box column. Ask for Booklet U-25-B.



Production type Direct Drive Uprights, 21", 24" and 28" sizes are engineered to suit your job; 3 HP to 10 HP. Write for Booklet U-27.



Portable Horizontal Drill, 1½ HP. Easily moved to the job. Spindle adjusts vertically and thru 360° in horizontal plane.

RADIAL AND UPRIGHT DRILLING MACHINES

THE CINCINNATI BICKFORD TOOL CO.

Cincinnati 9, Ohio, U.S.A.

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Pennsylvania Salt Mfg. Co.
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C. L. FAUST
Battelle Memorial Institute
Columbus, O.

CLEANING AND FINISHING

FORUM ON TECHNICAL PROGRESS

Little hope held for ease in nickel shortage this year . . . ultrasonic cleaning finds new uses . . . stainless rack tips replace bronze tips in plating . . epoxy-base paints on increase . . . metal cleaning used 275 million lb of trichlorethylene last year . . .

Mr. Gibson . . .

A new, phosphate coating process eliminates the ground coat in the porcelain enameling of steel. The treatment improves physical characteristics, simplifies production and reduces costs. Premium base metals need not be used. This one-coat porcelain enamel system combines all the end-use attributes now furnished by a multiple-coat system.

The process consists of cleaning the metal surface of an enameling iron or cold-rolled steel, chemically converting the surface to a phosphate coating, properly rinsing the coating and then prefiring it to form an oxide layer. The phosphate coating controls oxidation during prefire, so that the resultant oxides have the proper physical and chemical properties to directly accept the finish coat of porcelain enamel.

Mr. Loengard . . .

Since the crack-free chromium plating process was announced last spring, a wide variety of applications have developed. In addition to corrosion and wear protection, it has proved to be economical in decorative finishing. It is particularly valuable where both wear resistance (heavy deposit) and decorative qualities are needed.

As a result of improved baths and better controls, metal finishers are making more use of alloy plating to give metal deposits tailored to more stringent needs. High-quality alloy plating baths available include bronze, tin-zinc and tin-nickel.

The development of spray plastisols has greatly widened their field of application. Electrostatic spraying of plastisols not only increases the speed of coating but also cuts down on waste due to overspray. It makes it possible to reduce production costs and get a superior coating.

Mr. Spring . . .

New spray alkaline cleaners with markedly improved detergency characteristics are becoming increasingly popular. This points up the principle that both mechanical action and detergency are important in spray cleaning. The use of special, high-flash-point, emulsifiable solvent cleaners is increasing as plants become more safety conscious.

Greater use of aluminum has brought emphasis to cleaning this sensitive material. Mold etchants, nonetch cleaners, deoxidizers, etchants and deep etchants are being marketed in increasing volume, with improved quality and application technology. Better masking materials for the last process, more commonly known as chem-milling, are bringing large-scale commercial use of the process closer to realization.

Some progress has been made in the use of alkaline derusting and cleaning compositions, an innovation being its application without electric current. Chemical costs are still high, making this a special-situation material.

Mr. Faust . . .

Chemical and electrochemical methods of metal finishing are becoming more important. Electroplated coatings give titanium and its alloys better wear and galling properties. Electro-deposited titanium will find use where the basic metal structure can withstand the rigors of a fused salt plating bath. Molybdenum can be electroplated with certain other metals and subsequently hot forged without detriment to the plate.

Electrodeposited metallic coatings provide the necessary adhesive medium for either cold or hot-roll cladding of a pair of other metals. They can be used to give a suitable alloy interface or act as a barrier to prevent diffusion alloying. For such

A. E. CARPENTER
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President, Allied Research
Products Inc., Baltimore

use, we can expect to see more interest in the inert noble metals.

Alloy coating by direct codeposition or by heat diffusion of layers of single metal plates has great potential advantages. Alloy electroplates are proving their advantage over single metal plates by improved corrosion resistance and protection, combined with better mechanical properties.

Mr. Carpenter . . .

One phase of metal cleaning, not widely explored, is a combination of phosphating and cleaning in a single tank. Acid phosphate cleaning makes it possible to remove ordinary shop soil and deposit an even, hard phosphate film on the clean surface.

The iron phosphate film prevents corrosion from spreading under the paint should the film be scratched or broken. By painting over a phosphated surface any tendency of the paint to crack or split is reduced.

This phosphate film is not a rust preventive for outdoor protection but can be used to advantage when making file cabinets, metal furniture, shelving or similar indoor items that are to be painted, japanned or lacquered.

Progress has been made in removing ordinary shop soil in production without using hot, steamy tanks or washers. Parts are cool to the touch and the shop is cooler, yet no low-flash solvents are used. Still-tank cleaning (employing agitation, but at room temperature) is being used to remove cutting oils, drawing compounds, lubricants or rust preventives.

Mr. Diggin . . .

A new, air-agitated nickel plating process is being used in many high production plants. It produces full-bright, high-leveling or scratch-hiding deposits at an exceptionally high deposition rate. With sufficient direct-current power, production can be more than doubled on existing equipment, with a reduction of rejects.

Interest is high in duplex nickel coatings using around 80 per cent of a leveling, semibright nickel and the top coat of the bright type. Duplex coatings give better corrosion protection on steel, compared with the same thickness of a straight-bright coating, thus opening up the possibility of stretching limited nickel supplies.

The use of acid copper baths containing addition agents for smoothening and grain refinement is increasing for heavy copper plate on steel. As an undercoating for nickel-chromium top coats, it builds up corrosion protection with less nickel. Sizable commercial installations are using bronze (copper-tin alloy) electrodeposits as a base for nickel.

Mr. Duke . . .

For the first time, coated abrasives alone are being used to generate surface finishes so fine that parts can be painted or plated as they come off the finishing line. In many instances one, two and even three-step finishing methods are being replaced by systems such as the 3M method, which utilizes polishing and grinding wheels.

These wheels were designed primarily for use on rotary or straight-line automatic machines.

Benefits to the metal industries include: Savings in manpower (because the long life of coated abrasive wheels sharply reduces the amount of down time necessary for wheel changes); a saving in storage space (since they are shipped ready for use); and a saving in production space (because in most cases it takes fewer of these wheels to do a job).

This development will make it possible to incorporate into continuous finishing lines abrading jobs which are being handled as separate operations.

Mr. Irvin . . .

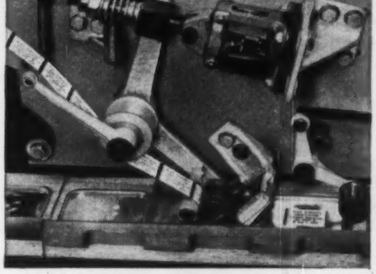
Increased co-operation between the metal finishing specialist of a product manufacturer and the equipment suppliers' development engineers is gradually eliminating "good enough" finishing. In its place, new finishes are being designed specifically for the particular problems at hand.

When chromate conversion finishes first came on the market, you had to use a certain metal and disregard appearance if you wanted the corrosion protection this finish offered. Now, there are chromates for many nonferrous metals, providing various appearances, including chemical polishing, and used either as a base for paint or final finish.

This was made possible by manufacturers who present their problems to the suppliers and a willingness on the part of the suppliers to do some research and development. This motivating power is growing stronger throughout industry. Research facilities are being expanded

Most

1. "SCOTCH" CELLOPHANE TAPE comes in many special types. Above, for example, No. 685 Riveters' Tape holds rivets in place in spite of vibrations. Tape has adhesive on edges only; clear center does not stick to rivets; edges strip off clean in 2 easy pulls.

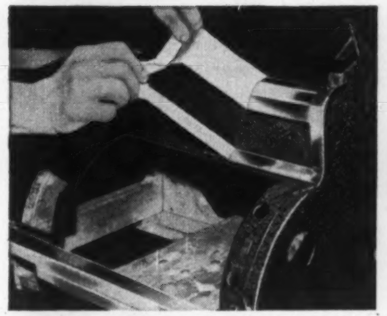


5. ACETATE FIBRE TAPE comes in 12 colors and transparent; can be printed easily. Above: Automatic applicator delivers predetermined lengths (labels) at production-line speeds. Tape is tight-holding; moisture resistant; meets Gov't. Specification JAN-P-127.

6. PLASTIC TAPES are available with many special properties: to resist acids, abrasion, alkalies, solvents, or combinations of these. Tape above is No. 470 Electroplating Tape for stop-off masking in plating. Thin, tough, stretchy —sticks at a touch!

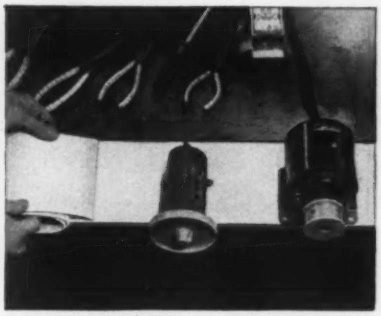
useful tool in your plant?

There are "SCOTCH" Brand Pressure-Sensitive Tapes to hold, seal, bind, mask, bond, bundle, protect, reinforce —in fact, to do hundreds of jobs in thousands of different ways. And wherever you use them, you'll profit through lowered costs, faster production, or improved products. What's more, these "tape tools" are even more valuable when you use automatic or semi-automatic tape applying equipment. We'll be glad to show you how such equipment can turn many a manual operation into a production-line step literally overnight. No cost or obligation, of course. Just check the coupon and drop it in the mail.



2. **MASKING TAPES** have flexible creped backings to allow them to fit curves and irregular surfaces easily. Above, High Heat Masking Tape No. 214 protects chrome on cash register; withstands temperatures up to 375°F. for several bakes; leaves no residue.

3. **FILAMENT TAPE** is a superior heavy-duty holding, bundling, and reinforcing material. Up to 500 lbs. tensile strength per inch of width; exclusive "mirror surface" adhesive sticks at a touch; puts all the strength to work. Tape won't mar products or cut hands.



4. **DOUBLE-COATED TAPES** give you *two* sides of the strongest adhesive on any pressure-sensitive tapes. Above, Tape No. 400 holds repaired motors and generators on testing bench; eliminates need for time-consuming drilling, bolting, and unbolting.

There are more than

300 PRESSURE-SENSITIVE TAPES

for industry, trademarked...

Reg. U.S. Pat. Off.

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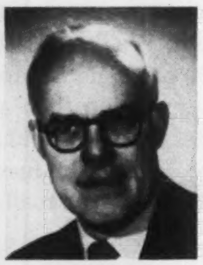
Railway Equipment Engineer
DeVilbiss Co., Toledo, O.



L. V. STECK
Vice President, Marketing
Shell Chemical Corp., New York

P. R. HENDRIXSON
Electrochemicals Dept., E. I. du Pont de Nemours & Co., Wilmington, Del.

N. G. BRANSON
President, Branson Ultrasonic Co., Stamford, Conn.

W. R. MEYER
President
Enthone Inc., New Haven, Conn.

because of active projects. Such continued and expanding co-operation paints an optimistic future for the development of new finishes.

Mr. Owen . . .

Our traveling spray painting booth, a self-contained paint shop, has a new feature—a paint heater.

This new booth has been delivered to the Norfolk & Western Railroad at Portsmouth, O. The heater will enable the road to gain greater hiding power from paint materials and more economy in the operation. The heater makes it possible to use lower atomization pressures, reducing overspray or wasted materials.

In addition to the paint heater, the booth will have the automatic spray feature for the refinishing of tops and sides of rolling stock. It will have three circulating systems to handle primer, black and red paint.

Mr. Steck . . .

Where resistance to acids, alkalies, detergents, weathering or hard wear is needed, epoxy-based paints are finding increased usage. An antibiotics plant is painted to stand up to daily washings; washers, dryers and other home appliances are primed to resist the corrosive action of soaps and detergents; laboratory furniture is coated to withstand a variety of reagents; boats are painted to eliminate the annual chore of repainting. In every instance an Epon resin-based formulation is used because of its superior adhesion, chemical resistance and resistance to abrasion and impact.

Perhaps even more exacting than maintenance paints and product finishes are applications for linings. Tank cars coated with a 6-mil, baked, epoxy compound carry 73-per-cent, rayon-grade caustic soda without contamination of the product or corrosion of the carrier. Similarly, drums and cans are lined with epoxy-based coatings to protect both the product and the container.

Mr. Hendrixson . . .

Metal cleaning used an estimated 275 million lb of trichlorethylene in the U. S. last year. Most of it went into conventional conveyorized and manually operated degreasers.

New trichlorethylenes with improved ruggedness were offered by several manufacturers. The continuing trend toward the so-called neutral grades is evidence of excellent performance and substantial savings in ordinary degreaser maintenance costs—less sludging in degreaser sumps means reduced contamination of machine heating surfaces.

The vapor degreasing process is extending its scope. It's being used to clean traction motors and stators, in stripping soluble resins and in certain photoengraving operations. Many branches of industry have not discovered the simplicity and versatility of this method of cleaning metals.

Mr. Branson . . .

Ultrasonic transducers and generators have been improved in performance and efficiency. Hermetically sealed, stainless-steel enclosed transducers have been developed, and large generators are available to drive any desired number of transducers.

Ultrasonic cleaning is finding increased acceptance on difficult applications, including removal of insoluble and slightly soluble soils. In addition to its accepted use on precision parts, it will be used on conveyorized machines handling high volumes of low-cost parts. Reduced cost of ultrasonic equipment will permit its installation in many new processes, where it will eliminate hand operations, reduce rejects in plating and finishing and reduce solvent costs.

Experimentation with the use of ultrasonic energy to accelerate plating and pickling processes should lead to some industrial installations during 1956.

Mr. Meyer . . .

The high cost of copper has forced industry to consider the substitution of aluminum. As a result, the use of chemicals for finishing aluminum, including those for electroplating preparation, has increased greatly. Chemical machining of aluminum has advanced; excellent work has been done in etching finished parts (with alkaline etchants) to great accuracy. Complicated shapes that were almost impossible to make by mechanical means have been made by chemical milling or machining.

New processes for alkaline derusting and descaling are finding wide use in preparing metals for electroplating. There are decided advantages

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INDUSTRY'S WORKSHOP FOR THE FINEST IN PLATING AND POLISHING PROCESSES · EQUIPMENT · SUPPLIES

T. J. KEARNEY
Director of Engineering
Detrex Corp., Detroit

M. G. KRAMER
Director of Application Research
Wyandotte Chemicals Corp.,
Wyandotte, Mich.

R. B. SALTONSTALL
Technical Director
Udylite Corp., Detroit

over acid treatments: Reduction in hydrogen embrittlement, little or no attack upon the base metal, little or no carbon smut formation. Aqueous alkaline descaling processes are being used in automatic machines in place of acid treatments.

Mr. Kearney . . .

Ultrasonics has become an integral part of the American production system. Degreasing by ultrasonics is producing a high degree of cleaning and reducing cleaning costs. Equipment ranges from hand-operated units through monorail and crossbar conveyorized units to fully automated, hydraulically operated machines.

The products cleaned include critical automotive parts, such as automatic transmission parts in rocker arm shafts, steering gear mechanisms and hydraulic valve lifter bodies.

Other industries getting outstanding results at lower costs include manufacturers and users of antifriction bearings, costume jewelry and manufacturers of hydraulic pump and valve components.

Mr. Kramer . . .

Increasing use of automatic processing equipment in metal finishing requires more consistent performance from industrial cleaners. Reliable information regarding cleaning effectiveness at any point in the operating life of the cleaner is needed.

The development of metal cleaners involves consideration of a variety of metals and their chemical reactions with cleaning solutions, the surface condition of the metals and a complexity of soils. A growing knowledge of these principles and more refined laboratory methods, including radioactive tracer techniques, are giving a better insight into the mechanisms of detergency.

Mr. Saltonstall . . .

The nickel shortage is still acute. Little hope is held for much improvement during the coming year. Increased demands, especially in the automotive industry, will be met with foreign and other premium-priced metal.

More emphasis is being placed on physical properties and protective value of bright nickel-chromium coatings. For economic reasons, work on brightness and leveling continues unabated. The use of air agitation in bright nickel plating solutions is increasing. It allows higher

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current densities—thus increasing productivity of equipment.

Bright anodized aluminum, both clear and colored, is appearing on automobiles as an alternate for steel and zinc diecastings plated with nickel and chromium.

Order backlogs for equipment indicate increased automation in electroplating is a certainty. This includes small parts plated in bulk as well as racked parts.

A. D. DUNCAN
Vice President
Glidden Co., Cleveland

S. J. SWENSSON
Secretary, American Hot Dip
Galvanizers Assn. Inc., Pittsburgh

GORDON RICE
Technical Dept., Turco
Products Inc., Los Angeles

Mr. Duncan . . .

Today, there is no longer a problem of whether a coating is available to meet specific conditions. Rather, the problem is what type to select to provide the special protective and decorative qualities you want and how to use it correctly and efficiently.

We have many choices—lacquers, phenolics, alkyds, epoxies, acrylics, ureas, melamines, silicones, polyesters, emulsions, organisols and others. Any of them may be modified in innumerable ways to provide limitless combinations of physical and resistance properties.

Developments in paints have come fast, and the end is not in sight. Major paint suppliers maintain aggressive research programs to provide expert technical advice for those companies desiring assistance on skilled coating selection and intelligent direction in its use.

Mr. Swensson . . .

The quality control committee of the American Hot Dip Galvanizers Association is developing a program for 1956 that will work toward an improvement of the quality of zinc coatings and better pickling practices. It will continue its study predicated on certain trends toward thicker or heavier coatings.

This committee also may work on specifications for items not covered. When ready, a petition will be made to the American Society for Testing Materials to see if the specifications will be accepted.

Mr. Rice . . .

We have developed a series of compounds, containing an aqueous alkaline solution, for removing oxides from all types of steel. Our work showed it was not feasible from the

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W. P. INNES
Technical Director, MacDermid Inc.
Waterbury, Conn.

standpoint of economics and descaling times to use one compound for the different alloys.

Two compounds were developed for the relatively easy removal of rust and corrosion products from carbon steel and low-alloy, high-strength steels. Another compound removes heat scales from these low-alloy steels. A heavy-duty compound is used to remove the tenacious oxides formed on high-alloy steels.

As no hydrogen is developed during the alkaline descaling, hydrogen embrittlement is nil. Consumption of the alkaline ingredients is low, since the compound acts only to remove the scale without attacking the base metal. The only equipment necessary for the operation is a heated tank.

Mr. Innes . . .

Spring - tempered, stainless - steel rack tips for electroplating have replaced conventional bronze tips in many installations. Copper, nickel and chromium which build up on the stainless tip can be stripped by immersion in a metal stripping solution. This is an advantage over bronze tips which have a short life owing to the mechanical removal of built-up electrodeposits.

Chemicals have been developed for use in the final hot rinse to give stain-free drying of plated and phosphated work and to eliminate the problem of cyanide spotting out.

In addition to giving bright, decorative finishes, electropolishing and chemical polishing are being used for deburring and electromachining ferrous and nonferrous metals. These chemical processes are solving many difficult deburring and machining problems.

Plating development works big changes in metal finishing

◆ Companies plating products with chromium are switching to an advanced process developed by United Chromium . . .

◆ Benefits achieved include fast production, increases in capacity of existing equipment, savings in power, better finishing . . .

Things changed abruptly a few short years ago for companies finishing products with chromium when the Unichrome SRHS Chromium Plating Solution was introduced. It gave users a more efficient, more easily controlled and faster process . . . resulting in better finishing and substantial savings. Here are some recent reports from the field:

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This is just one of many United Chromium developments in processes, equipment and materials which provide opportunities to cut your finishing costs . . . opportunities to turn out a better product through a better finish. We'd welcome the chance to work with you.

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General Manager, Welding Equipment Div., Harnischfeger Corp. Milwaukee

FRITZ ROSENTHAL
Research Chemist
Armour Research Foundation, Chicago

DAVID SCIAKY
President
Sciaky Bros. Inc., Chicago

JOINING AND ASSEMBLY

FORUM ON TECHNICAL PROGRESS

New-type iron powder electrodes appear . . . carbon-dioxide-gas-shielded welding will increase . . . more interest in special fasteners . . . better controls are in the resistance welding picture . . . new, high-strength adhesives have heat resistance . . .

Mr. Gade . . .

Threaded steel fasteners with tensile strengths of 240,000 psi will be produced this year. Bolts with a tensile strength of 275,000 or 300,000 psi are possible. The new fasteners will mean major weight savings in aircraft and a new degree of freedom for mechanical designers in general.

This jump in bolt strength stems from new processing techniques. They make it possible to produce threaded fasteners that have high fatigue as well as static tensile performance. Endurance limit of the new bolts: 60,000 to 80,000 psi, compared with 40,000 psi in the best existing aircraft bolts.

The fatigue problem was solved last year in titanium—a notoriously notch-sensitive metal—with the development of 150,000-psi bolts with fatigue properties superior to those of their steel counterparts. Improvements in titanium alloys will mean even stronger fasteners.

Mr. Monsler . . .

The terrific competition among welding fabricators has forced equipment manufacturers to come up with new electrodes and welding machines. Welding fabricators have turned to downhand welding in an effort to cut fabricating costs. As a result, equipment makers have come up with three developments:

1. New type iron powder electrodes in mild steel and low hydrogen varieties. These electrodes deposit more pounds per hour and give a smooth fillet.
2. Larger welding machines with higher duty cycle possibilities to use the new types of electrodes. Where previously the 200 and 300-amp machines were sufficient, the trend is to 400, 500 and 600-amp machines, both in ac and dc type equipment.
3. Welding positioners. They make it possible to downhand weld every foot of weld at a terrific savings in handling costs and welding hours. The trend toward more automatic welding will make the use of welding positioners much more necessary in the near future.

Mr. Rosenthal . . .

Advantages of adhesive bonding in mass production are: 1. Adhesive materials generally are less costly than other joining materials. 2. Sturdier construction usually results. 3. Less finishing generally is required than when welding, soldering or brazing are used. 4. Labor costs are low since few specialized workers are required. 5. Greater speed of assembly reduces production costs. 6. The design often can be simplified. 7. Lighter weight of the completed assembly results in economies in packing and shipping.

The following adhesives were evaluated at the Wright Air Development Center for shear strength on bonded, aluminum-alloy lap joints: Vinyl-phenolic, nitrile rubber-phenolic, phenolic-Nylon-Neoprene and Epoxide. They show high shear strength, good adhesion to metals, good tensile, static and dynamic fatigue strengths.

One application of sandwich construction is in the fabrication of skins and floors for pressurized aircraft fuselages where the structure is subjected to lateral pressures and axial loads simultaneously. Tests at the National Bureau of Standards show that bonded sheet-stringer panels are comparable with riveted panels in mechanical properties, but have the advantage of the increased sheet stability obtained by bonding.

Mr. Sciaky . . .

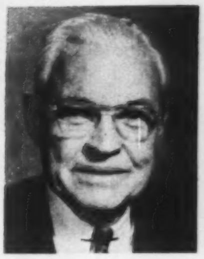
Self-improvement in the resistance welding industry demands education—primarily for the user. The potential of resistance welding techniques is tremendous. Unfortunately, all areas of metalworking don't know about the potential.

Technical advances, far outdistanc-

H. C. BARNES
Consulting Engineer
Armco Steel Corp., Middletown, O.

F. R. HENSEL
Vice President, P. R. Mallory
Co. Inc., Indianapolis

W. G. WALTERMIRE
Chief Product Engineer
Lamson & Sessions Co., Cleveland



J. S. DAVEY
Vice President, Russell, Burdsall
& Ward Bolt & Nut Co.
Port Chester, N. Y.

ing application knowledge, are becoming almost meaningless. Even long-time users of resistance welding methods have only scratched the surface of the potential.

The new, $750,000 Sciaky research facility is aimed directly at the problem of education. Its program of application development and the accumulation of application data is the first major steps in opening the many volumes of fabrication possibilities for resistance welding.

Mr. Barnes . . .

Future developments in cold-pressure welding will permit buttwelding aluminum and copper wires from 24 gage up to ½-in. diameter, in all shapes and cross sections. Foil packaging, copper contact areas on aluminum bus and cold-pressure welding of all connections in complete electrical assemblies at one operation will be available this year. Already in production are:

1. Copper-to-aluminum, cold-pressure-welded transition tubes for the refrigeration industry. These tube welds are free from porosity or the brittle intermetallic compound experienced when such welds are made by heat.

2. Welding of aluminum-to-aluminum tubing between refrigeration components at assembly with air-powered, cold-pressure welding tools.

3. Copper-to-aluminum, electrical sleeve connectors for making electrical connections between copper conductors and aluminum conductors in electrical distribution systems and in electrical apparatus.

4. Tools and equipment to provide dependable termination for electrical equipment wound with aluminum. Wires and strip conductors of various sizes and shapes are cold-pressure welded to copper terminals or to themselves.

5. Sealing by cold-pressure welding of copper, aluminum, Kovar or combinations of these metals in hermetically sealed cases of transistors, diodes, relays, capacitors, etc.

Mr. Hensel . . .

As resistance welding is integrated into automation lines, better program controls and monitoring devices will be needed to insure reliability and consistency of welds. Investigations point to successful welding of certain ferrous and nonferrous metals which now are impractical or uneconomical to join by this technique.

Program timing, preheat, postheat, slope control and variable force sequencing will increase the scope of the process and insure a high degree of strength, consistency and sound metallurgical characteristics.

It is probable that the resistance welder of the future will automatically establish the proper welding conditions for a particular part from information supplied by punched cards or tape.

Mr. Waltermire . . .

Fastening research continues in the processing of new experimental steels and light metals. This involves metallurgical and cold and hot working processes. Companies are improving their processes and equipment in a continuing attempt to meet competition, cut costs and improve quality.

The high-tensile structural bolt is receiving growing acceptance in the structure industry. Building codes are being changed to accept them. Their production and use will multiply rapidly.

Development and use of special fasteners, such as lockbolts, lockscrews, locknuts, cage nuts and a long list of others, is speeding up. Another indication of this trend: The military is studying the possibility of preparing a handbook on fasteners and assembly practices. This seems to indicate growing recognition on the part of users of the key importance of fasteners on the strength and cost of assembling their structures, machines or equipment.

Mr. Davey . . .

A definite trend toward a single-thread series for fasteners is in the making as coarse threads show their superiority over fine threads for high-stress applications. While fine-thread fasteners are adequate for low-stress uses, they become the weakest link in the head-shank-nut assembly in higher-stress joints.

Bolts with undersize shanks will come into greater use. This type fastener will add 15 to 20 per cent to the strength of the joint. The undersize shank will carry a higher unit of stress because of its reduced area. Tightening results in greater elastic elongation, which means greater settling or Brinelling of the joint before residual stress in the bolt is relinquished. For finished products, the undersize shank means smaller clearance holes, and a more generous

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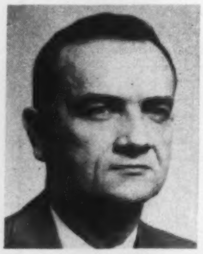

J. F. GALBRAITH
Manager, Welding Development
Linde Air Products Co., New York

fillet under the head of the bolt.

High-tensile-strength bolts as a replacement for rivets in structural applications are a promising development; within five years, the majority of new buildings erected will be bolted.

Mr. Kugler . . .

Look for greater activity in the use of the new, iron powder, low hydrogen electrode. It combines the high quality and mechanical properties of low hydrogen electrodes with the high deposition rates of the iron powder electrode.

Inert-gas arc welding with consumable electrodes offers attractive possibilities. Using either argon with oxygen or carbon dioxide, it is possible to duplicate the weld metal quality you get with conventional covered electrodes.

Brazing processes continue to expand. The success of high temperature brazing alloys in fabricating jet engines has led to investigation of their use for power plant components, such as heat exchangers.

A new and interesting development which will bear watching is inert-gas arc cutting of nonferrous metals.

Mr. Flora . . .

Standardization has entered the fastener field. Engineered fasteners are becoming stock items. Costs are lower due to volume usage. But their main contribution to reduced manufacturing costs lies in their ability to perform two, three or more functions, in addition to the prime fastening job.

With the acceptance of standards, further economies will be passed along. Time and money spent for design and fabrication of new tools will be eliminated. It will no longer be necessary to spend time getting necessary approvals for particular fastening applications.

Mr. Johnson . . .

The most fertile fields in brazing are:

1. The development of new fluxes, particularly for low temperature operations (1200 to 1600° F). They should not only avoid the use of fluoride compounds which emit toxic fumes but also consist entirely of components with low vapor pressures and good activation throughout the brazing temperature range.

2. The discovery of new brazing alloys which are more universal in their application. This work will probably fall into two categories: Silver alloys which use metals that either supplement or displace components normally found in this type alloy; and alloys in the greater-than-1800° F brazing range.

3. Formulation of a new alloy which gives joint strength equivalent to copper for furnace joining of steel and ferrous alloys. It should be usable in the temperature range of 1600 to 1800° F.

Mr. Wehmer . . .

New high-strength adhesives have been developed for honeycomb structures and metal-to-metal bonding. New resin and nitrile rubber adhesives with heat resistance up to 300°F are increasing adhesive applications in the aircraft field.

Adhesive-bonded metal structures have high strength, are light and permit low-cost designs. The trailer industry is making wide use of honeycomb structures. Metal sheets are bonded to paper honeycombs with high-strength adhesives. Such types of structures may come under serious consideration for automotive applications when that industry begins to emphasize lighter weight in automobile designs.

The recent availability of several new synthetic rubbers (of the natural-rubber type) is spurring research. New adhesives are expected to be developed as a result of this work.

Mr. Galbraith . . .

Tungsten-arc cutting promises to be a significant contribution to metalworking industries. This new, high-speed process produces high-quality cut surfaces, particularly on nonferrous materials. The method can be used mechanically or manually in any position. It cuts straight lines, bevels, circles and shapes.

The development of argon-hydrogen mixtures for welding high-alloy materials like stainless steel should do much to offset past shortages of

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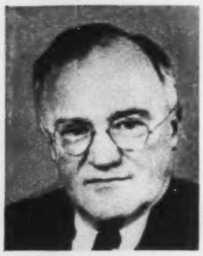


A. F. DAVIS
Vice President
Lincoln Electric Co., Cleveland

R. W. TUTHILL
Supervisor, Welding Process
Engineering, General Electric
Co., York, Pa.

helium. When substituted for helium, argon-hydrogen mixtures usually work as well and often result in higher welding speeds and in lower costs.

Other developments: 1. New techniques for sigma welding gage thicknesses of aluminum and stainless-steel materials using 0.020 to 0.047-in. wires. 2. New materials and procedures for submerged-arc welding of high-strength (minimum yield strength of 90,000 psi) steels. 3. Satisfactory techniques for welding commercially pure titanium and titanium alloys by the inert-gas, tungsten-arc process.

Mr. Davis . . .

The trend to welded construction in the machine tool industry is unmistakable. The potential market in this field for steel and welding equipment is large. The other major potential market for welding is the structural field. Recent reports of major bridges being welded for some of the country's new superhighways evidence an accelerated trend.

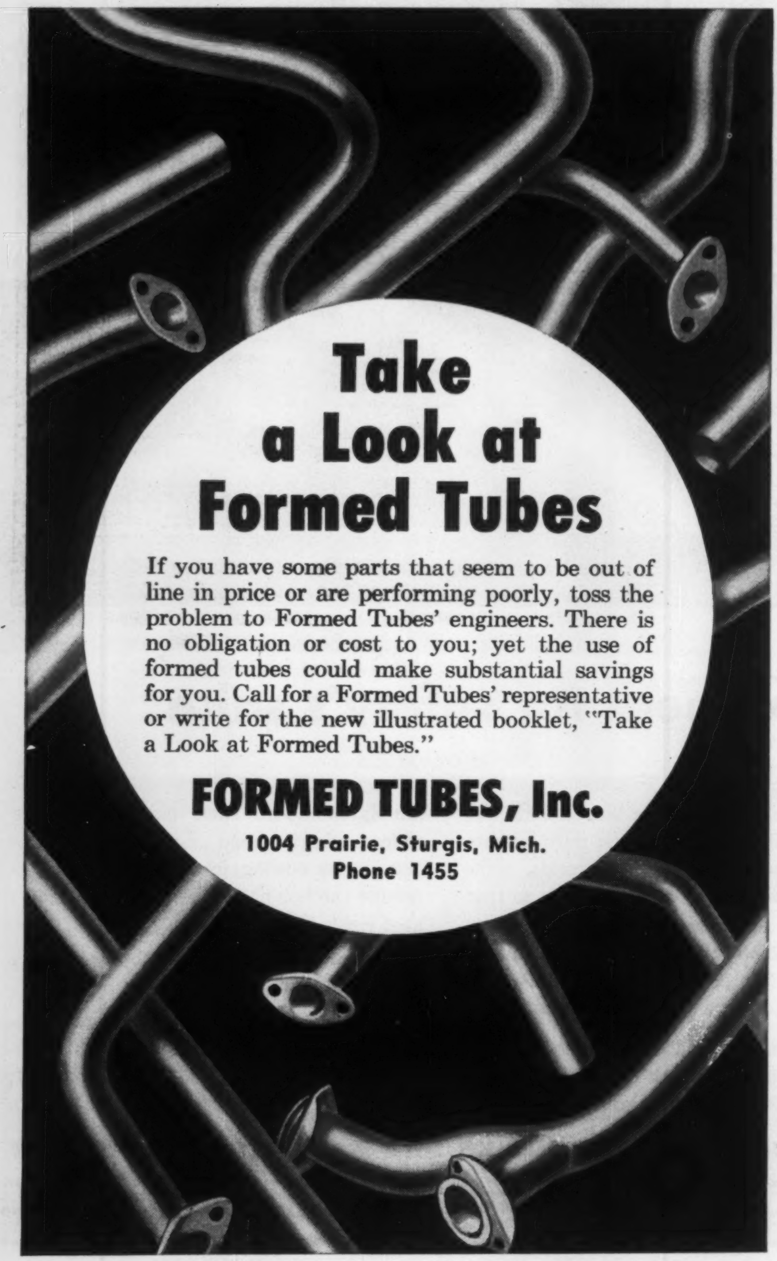
The most significant development in electrodes continues to be in the iron-powder types. The effect they have in reducing welding time through increased speeds and better quality results in lower, over-all welding costs. The latest development in these electrodes is an all-position type for production welding in vertical and horizontal positions, as well as downhand.

Automatic welding will continue to increase in both maintenance and production applications. New developments in fluxes and machines are enlarging the number and types of jobs on which it becomes practical to tool for automatic welding.

Mr. Tuthill . . .

Automation in welding will be the byword in 1956 and the years to come. New developments and equipment will simplify control of fusion arc welding. This will result in better quality welds on applications that might not have been possible before. Improvements in equipment for feeding bare electrodes and, in particular, new types of power sources for the welding current will make this possible.

A major step already has been



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If you have some parts that seem to be out of line in price or are performing poorly, toss the problem to Formed Tubes' engineers. There is no obligation or cost to you; yet the use of formed tubes could make substantial savings for you. Call for a Formed Tubes' representative or write for the new illustrated booklet, "Take a Look at Formed Tubes."

FORMED TUBES, Inc.
1004 Prairie, Sturgis, Mich.
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made in pilot applications of economical, carbon-dioxide, gas - shielded welding. This year should see accelerated uses of this process in welding steel. This is the first major change in low-cost, automatic welding of steel in many years.

Future progress in developing electrodes for gas shielded welding will make this method a major factor in advancing automation in welding.

I. A. OEHLER
Manager of Manufacturing,
American Welding & Mfg. Co.
Warren, O.

I. W. EVANS
Chief Welding & Development
Engineer, Morgan Engineering Co.
Alliance, O.

Mr. Oehler . . .

Several new automatic welding heads for submerged arc and inert-gas arc welding processes were introduced last year. They permit greater flexibility in the selection of welding variables and use more sensitive control systems to maintain established settings.

Welding positioners have been improved by better drive and speed control mechanisms and more rigid construction. They are of particular importance in the welding of high temperature alloys and aircraft materials.

The design trend in fixturing is toward rapid loading and unloading, elimination of the need for tacking and doing other operations on the work while it is in the fixture.

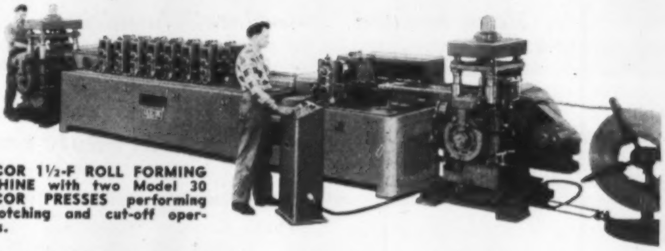
Mr. Evans . . .

In the near future, submerged arc welding will be commonplace even in job-shop-type operations. The use of paper templates, or the type used for magnetic or electronic tracing will allow irregular shapes to be welded economically by this process.

The increasing demand for all equipment manufacturers to design and build machinery of higher capacities makes it mandatory that welded joints be of the highest quality. Within our own organization we use a combination of submerged arc welding with tracing devices to fabricate all girders and hoisting drums.

A recent contribution to submerged arc welding and inert-gas-shielded arc welding is the constant voltage power supply, which allows accurate presetting. Inert-gas-shielded, consumable-electrode arc welding, using carbon dioxide as a shielding gas, and inert-gas-shielded cutting of aluminum are two of the most impressive recent developments because of their wide application possibilities.

ARDCOR Roll Forming Mills


ARDCOR 1½-F ROLL FORMING MACHINE with two Model 30 ARDCOR PRESSES performing pre-notching and cut-off operations.

COMPARE These Exclusive Features . . . .

UNIT DESIGN—spindles in self-contained SEPARATE HOUSINGS, with speed reducers. Easily removed or replaced.

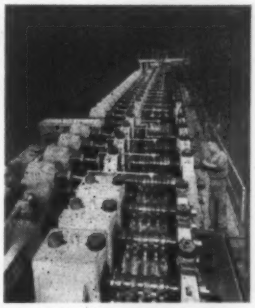
LARGE RANGE OF VERTICAL ADJUSTMENT through toggle gearing.

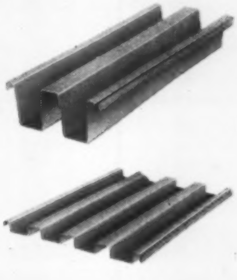
DOUBLE BEARING DESIGN OF DRIVE HOUSINGS adds greatly to rigidity—increases bearing and gear life.

ALL BEARINGS ARE ANTI-FRICTION — no sleeve bearings, even on idler gears.

MICROMETER TYPE DIALS assure a positive setting both on drive and outboard housing.

ONE OF THE LARGEST MACHINES EVER BUILT
ROLLS FLOORING, ROOF DECK . . .


Left: One of three mammoth ARDCOR Roll Forming Machines designed to form steel roof deck and flooring up to 132 ft. per minute. Entire production line 180 ft. long; approximate weight of equipment, 300 tons.



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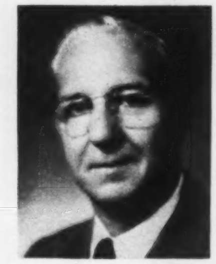
J. H. PERITZ
Executive Secretary, Electric Overhead Crane Institute
Washington



H. G. WALTER
President, Gerrard Steel Strapping Div., U. S. Steel Corp.
Chicago

E. W. FRANZ
Vice President, May-Fran Engineering Co., Cleveland

B. W. SAUNDERS
Associate Professor, College of Engineering, Cornell University, Ithaca, N. Y.

HANDLING AND PACKAGING

FORUM ON TECHNICAL PROGRESS

Move toward "one-time" handling . . . unit loads getting bigger play . . . more steel shipping containers will be produced . . . fork trucks will get specialized attachments . . . improvements coming in heavy-duty packaging . . .

Mr. Peritz . . .

Electric overhead crane manufacturers are making rapid strides in the development of new techniques. The concept of cranes as mere lifting and carrying devices is outmoded.

A few of the implements making overhead cranes a more effective and efficient tool include: The use of radio and closed-circuit television for remote control operations; the adaptation of specially designed grabs, hooks, arms and attachments; air-conditioned cabs for increased operator efficiency in hazardous or unhealthy locations; and transfer interlocks enlarging crane area coverage.

Improvements in the design of motors, brakes, electrical controls, gears, conductors and new discoveries in the alloys and use of metals can be expected. It is a certainty that builders of electric overhead cranes will reflect these improvements in their products.

Mr. Walter . . .

Progress in the strapping field has three measurements: Improvements in the quality of material, improvements in equipment and improvements in methods of packaging, materials handling or carloading. The quality of flat steel strapping has been improved through normalizing processes and better finishes. Some forms of round steel strapping are available on convenient pay-off-pak-type drums.

To speed up heavy-duty packaging, especially in steel mills, a variety of powered stretchers and sealers have been developed. We can look forward to continued flow of improved powered, automation-geared tools for heavy-duty packaging. We also can look forward to seeing predetermined tension flat steel strapping stretchers.

Studies are going on to develop an improved tin plate package, as well as a new tin plate carloading method. Expanded use will be made of strapping on the specially equipped railroad cars with permanent bulkheads. Originating in the gypsum industry, these cars are being used on lumber loads.

Mr. Franz . . .

To produce more products, it is necessary to apply automation to the removal of the chips, turnings and borings which can clog or otherwise hamper normal machining operations. What is needed are scrap handling systems of a "custom" nature which are assembled from standardized components.

The demand for such scrap removal systems is growing. The ultimate user of the metal removing machine indicates marked interest in the machine and/or system that will remove the "leavings." The machine builders are making progress in meeting this demand.

We have just completed a period of research, development and production on standardized scrap handling conveyor sections which can be assembled to meet customized needs. The systems are providing metalworking plants with increased production because of automatic scrap conveyance, as well as from the advantages gained through better housekeeping methods.

Mr. Saunders . . .

Materials handling education will follow two distinct paths—on-the-job training programs for men in industry and college courses for engineering students. On-the-job programs will center largely on the "how" of handling materials. More evening programs will be instituted, laboratories to allow for experimentation will be constructed and learning by doing both in the laboratory and on field trips will be the order of the day.

Engineering colleges will give an increasing emphasis to materials handling, because it is a vital element in our manufacturing and distribution system. More emphasis will be placed on the "system" con-

E. F. TWYMAN
Vice President, Yale & Towne Mfg. Co., New York

L. WEST SHEA
Secretary, Material Handling Institute Inc., Pittsburgh

H. M. PALMER
Vice President, Lewis-Shepard Products Inc., Watertown, Mass.

S. K. TOWSON
President, Elwell-Parker Electric Co., Cleveland

cept, and the "system" will be scrutinized carefully in both a technical and economic sense. Such programs will place a much greater emphasis on the "why" of materials handling and less on the "how."

The need is apparent for both types of programs. One is intended to satisfy immediate manpower needs. The other allows for searching inquiry and promotes creative thinking and development of the ideas, concepts and methodology of handling materials.

Mr. Twyman . . .

There is a trend to standardizing packages in a modular unit size. This will permit making up standard unit cubes of packaged materials to simplify mechanized handling for freight cars and street trucks. Accompanying this development is the binding of loose boxes into unit cube loads for transportation purposes.

A new type, large rubber shipping and storage bottle with an inner steel frame permits more efficient and lower unit cost chemical handling. Standard industrial lift trucks can handle these bottles faster and safer than the former containers whose frequent breakage added greatly to shipping and storage costs.

Another development is automatic torque transmission for industrial lift trucks. It lets operators handle the most difficult of loads faster, easier and with less fatigue because they can inch up to any load easily and reverse direction without declutching.

We shall see more use of mechanical arms in place of the forks, so that a standard industrial lift truck will be able to grab, hold, lift, rotate and store loads in narrower aisles without the use of pallets. These mechanized arms will make the lift truck more flexible and reduce the cost of mechanized handling.

Mr. Shea . . .

Safety, speed of handling, rate of travel, versatility and specialized equipment are the five major fields equipment manufacturers will emphasize in 1956. The demand for all types of materials handling equipment is expected to continue high, exceeding that of 1955.

In the industrial, gas-lift-truck field, the trend is toward automatic transmissions.

Conveyor manufacturers are including more safety devices, selective switching equipment, electronic controls and special devices on equipment.

Overhead equipment developments are in the field of dispatching, stepped-up rate of travel and speed of handling.

A significant trend in the over-all field of materials handling is the increased interest of shippers and receivers in unit loads.

Mr. Palmer . . .

The trend in materials handling is toward space savings. Narrow aisle tiering trucks and higher stacking trucks are gaining prominence. By reducing aisles from 11 or 12 to 7 ft, many companies have done away with the need for building new warehouses. When new warehouses are built, they are usually single-story units with high ceilings to permit stacking to heights of 20 ft or more.

Trucks have been made which will go down a warehouse aisle, stop opposite the correct bay, lift to the correct height and side-load the unit load into its proper slot in the rack. All controls are preset before entering the storage area. All loads are assured of being in their proper position in the storage area. Manual operation is reduced to a minimum.

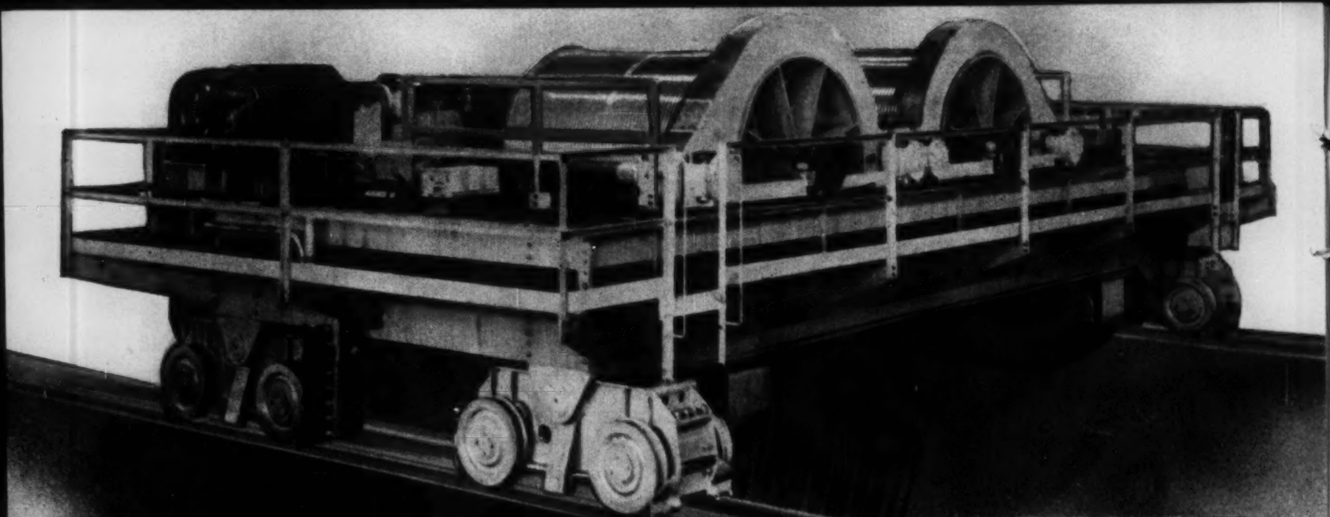
Some new controls limit the lifting height to which extra heavy loads can be raised. Ordinary loads can be raised to full heights, but heavier ones to intermediate heights only. Other new trucks cannot drop their loads into storage racks until the load is exactly positioned in the storage racks. Interlocks between truck and rack assure exact positioning.

Mr. Towson . . .

Major refinements in design for greater safety of operation and maximum ease of maintenance will highlight the contribution of the industrial truck industry in 1956.

In the past, it was necessary to sell on the basis of the benefits of mechanized, as opposed to manual handling. Today, with the philosophy of mechanized handling well understood throughout industry, it is necessary to show how a particular type of handling equipment is the best suited for a given operation.

The trend in industrial truck design is toward reducing over-all dimensions without reducing capacity. This is particularly true of larger capacity models, such as those used by the steel industry. Many manufacturers have already introduced such models. Elwell-Parker has brought out a more compact line of heavy-duty trucks for the steel industry, with capacities up to 80,000



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Alliance 450-ton, 4-girder, 60-foot span ladle crane handles 510-ton test load.

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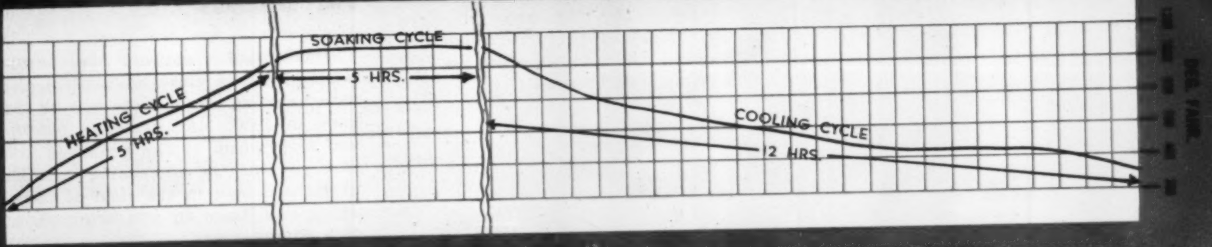
World's largest builders of world's largest cranes



TROLLEY FRAME BY *Alliance*

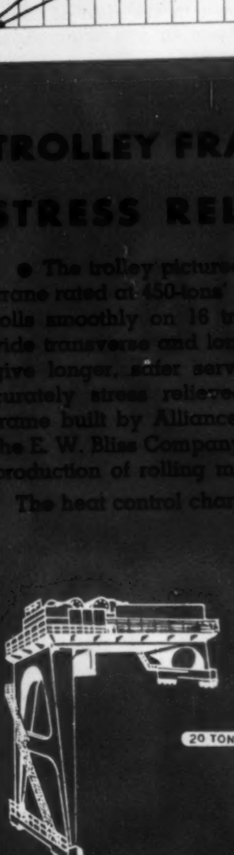
STRESS RELIEF BY BLISS

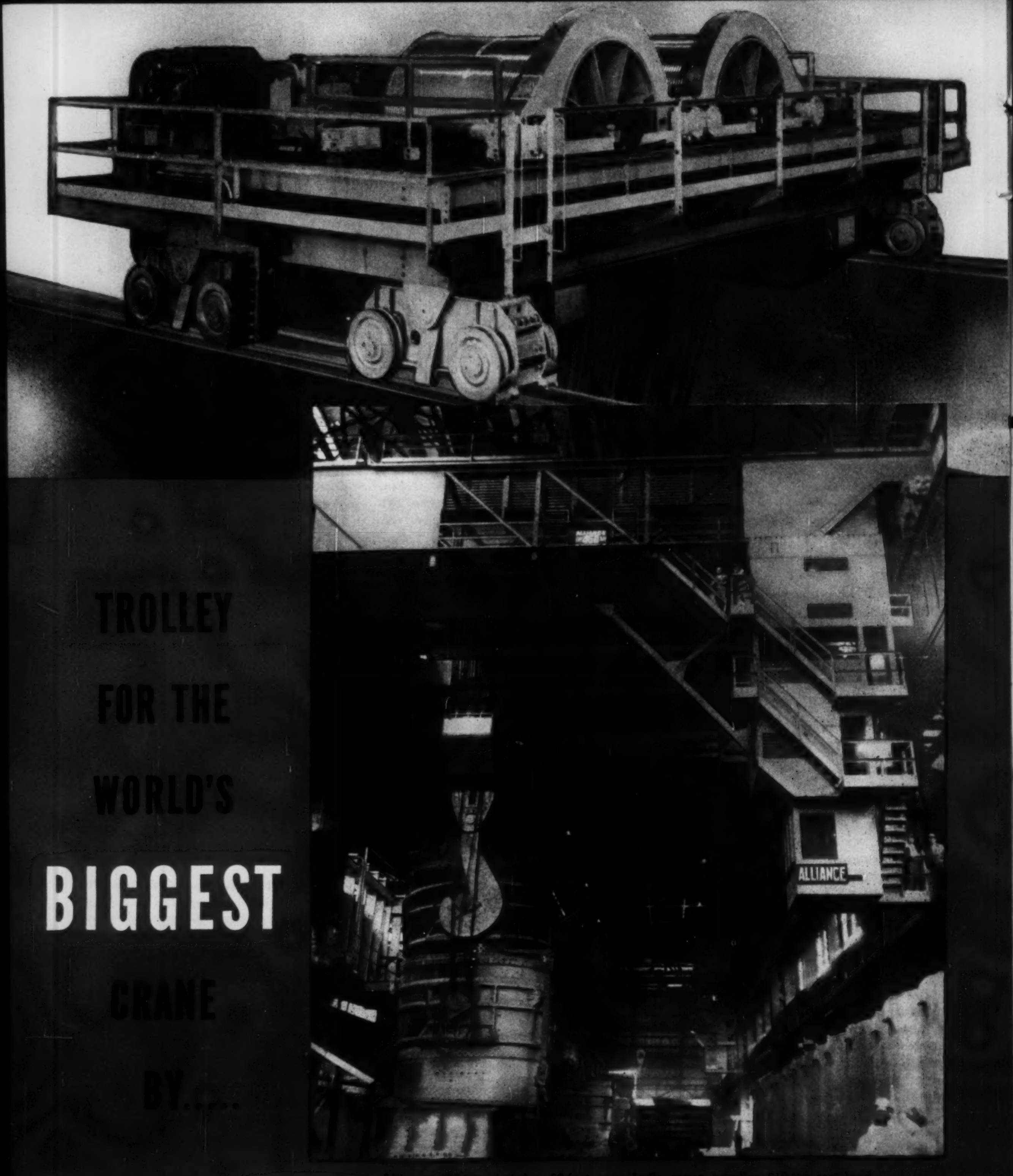
● The trolley pictured above is part of an Alliance crane rated at 450-tons' capacity. It's BIG! The trolley rolls smoothly on 16 track wheels arranged to provide transverse and longitudinal equalization. It will give longer, safer service because it has been accurately stress relieved. Since 1946 every trolley frame built by Alliance has been stress relieved by the E. W. Bliss Company— a leader in the design and production of rolling mill equipment.

The heat control chart is a reproduction of the chart used in stress relieving the frame shown above. The heating cycle is long; the soaking cycle is one hour at 1175° for each inch of thickness in the heaviest member.

Quality control extends through every phase of Alliance operations—design, engineering and production—including the use of outside help when necessary.

Before you start your expansion program discuss your lifting needs with the Alliance engineers. They'll help you reach an efficient, economical solution.





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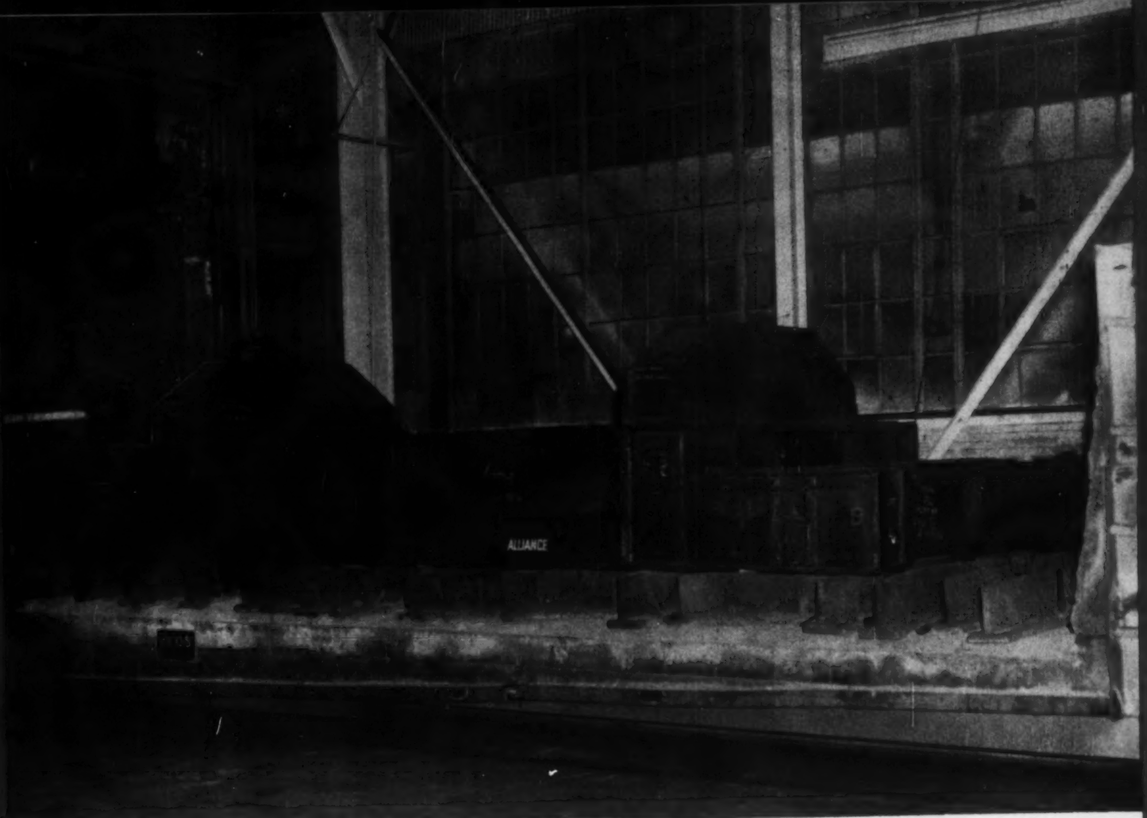

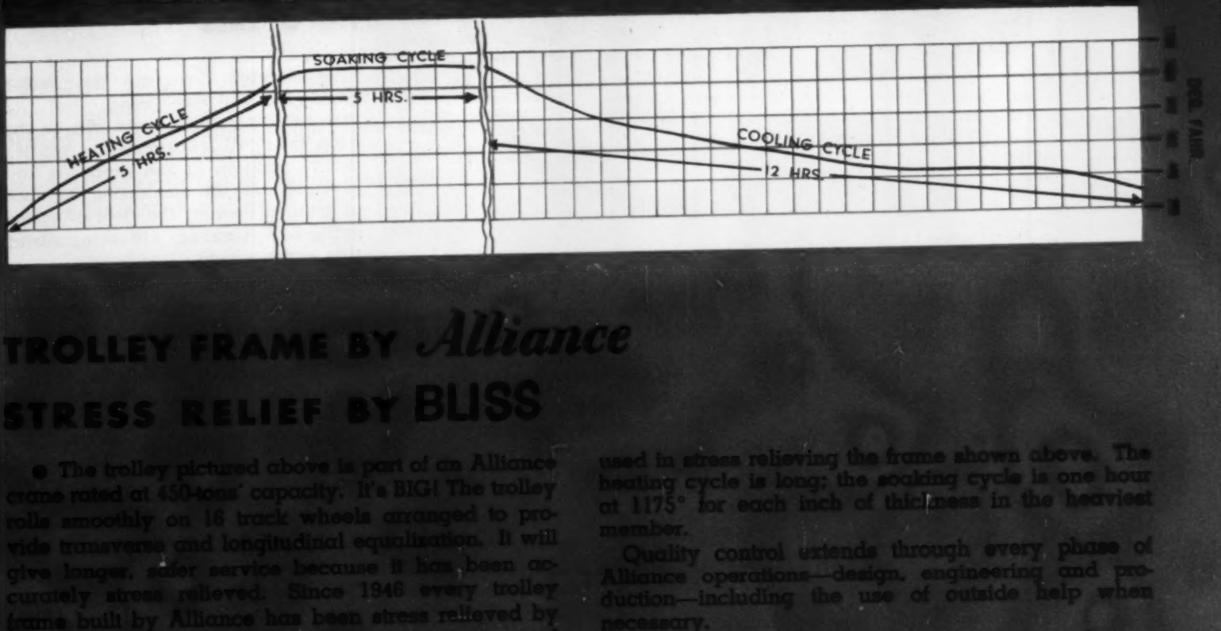

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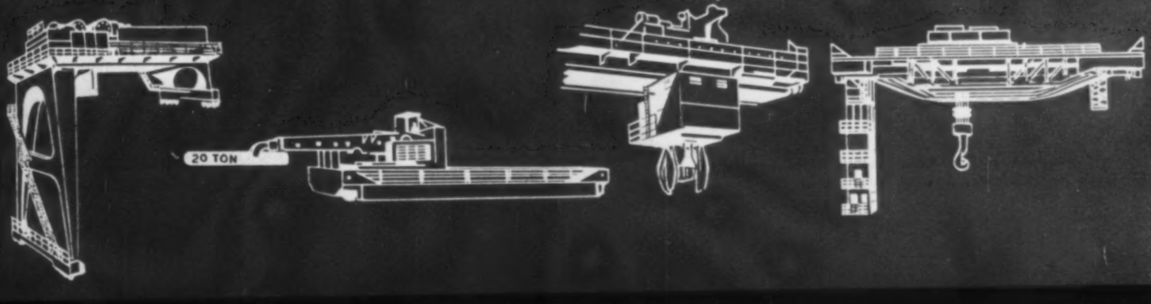
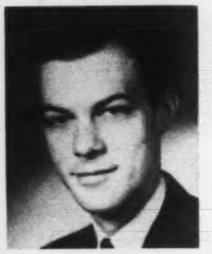


M. W. HEINRITZ
Vice President, Gould-National Batteries Inc., Trenton, N. J.



J. M. DELFS
Manager of General Machinery Sales, Apparatus Sales Div., General Electric Co., Schenectady, N. Y.

J. C. WEBB
President & General Manager
Jervis B. Webb Co., Detroit

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President, Acme Steel Products Div., Acme Steel Co.
Chicago

G. B. DAVIS
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Baker-Raulang Co., Cleveland

lb. This trend will continue because of industry demands for industrial trucks to handle heavier and heavier loads without sacrificing available production and storage areas.

Mr. Heinritz . . .

Hand in hand with automation, we find an increasing market for powered materials handling equipment, including conveyors, overhead cranes and fork lift trucks. Every progressive manufacturer is looking for handling devices which will reduce over-all production costs.

In the industrial storage battery field, the definite trend in motive power types for electric industrial trucks is toward larger capacities, with a greater operating range, greater flexibility and no greater requirement for floor space. Storage battery design takes advantage of the greater height in the new trucks to accomplish this objective.

Premium storage batteries are much in demand and are available throughout the industry. Standard types are being used in considerable quantities where initial costs are still the prime consideration.

Mr. Delfs . . .

Improved handling methods must be integrated into all attempts to achieve automatic production. Modern handling equipment provides the essential flow of material through the plant from receiving to shipping.

Manufacturers of materials handling equipment are accelerating the design of new products and redesigning lines. Advances in the industry since 1953 will far exceed the gains made in any comparable period.

Industrial management must not be content to meet next year's competition with last year's methods and equipment. Handling costs in receiving, processing, shipping, warehousing and distributing must receive increased attention because the reduction of these costs will add directly to profit without detracting from quality of the manufactured product.

Mr. Webb . . .

Before making decisions, management is vitally interested in supplementing its intuitive and crystal-ball thinking with a maximum number of facts about its operations. There has been considerable evidence that these facts can be obtained accurately in production industries only by conveyorization and phases of automation.

Real control of inventory, real knowledge of where the product stands (physically and costwise) at any one time in the manufacturing process, can only be obtained with the help of even, continuous mechanical control.

The future is exciting. Last year, mechanisms were to be revolutionized by electronics and atomic energy. This year, our prophets say that solar energy and water will provide the driving forces before atomic energy comes to full bloom. In the same way, new ideas in conveyors and automatics can make statements of this year look funny in the next. That is all for the good.

Mr. Bucuss . . .

Accelerated progress in better packaging and more economical and safe handling of products will be the pace in 1956. Management's continued recognition of the problems and savings and the increasing number of trained men in the field of packaging and handling will bring about this advancement.

While all industries will benefit by developing improved integrated methods of handling, perhaps the greatest strides have and will be made in steel, nonferrous metals, consumer durables and lumber. Efficient materials handling equipment and complementary products contribute materially to the profitable results in industry.

Mr. Davis . . .

The increasing attention being paid to flexibility and efficiency of yard materials handling is reflected in wider and more effective use of straddle carriers and the side-loading fork truck.

Also outstanding is the continuing trend toward more use of specialized fork truck attachments. Users want to get maximum benefit from the truck on jobs it would do less efficiently, or could not do at all, with forks or ram alone or with more-generalized attachments. Examples:

How Did Wyman-Gordon Cut Out ALL Lost Production Time In Moving a Machine Shop?

The old-timers said it couldn't be done in less than five days — but Barry Leveling Mounts so speeded the reinstallation of lathes, millers, and grinders that the entire moving operation took only a two-day weekend. The vital test-preparation department was ready for work again on Monday morning. The machines set on Barry Leveling Mounts required no drilling of floors, no lagging, no shimming — they were just spotted according to plant layout, and quickly leveled. And because Barry Mounts isolate vibration, the machines do not walk, building-borne noise is reduced, and the accuracy of the precision machines in the Test-preparation Department is protected.

Ask Barry how YOU can cut machine-moving costs.

How Did Bullard Stop ALL Toolroom Rejects Due to Vibration?

With the Bullard Company's toolroom only 50 feet from a main-line railroad track, the vibration from passing trains often caused work spoilage or lost time as grinder operators waited for trains to pass. Moving the toolroom was out of the question. But the seven surface grinders were isolated from external vibration by a simple installation of Barry Leveling Mounts under each machine — at a cost of only $50 per machine. Rejects due to vibration were completely eliminated!

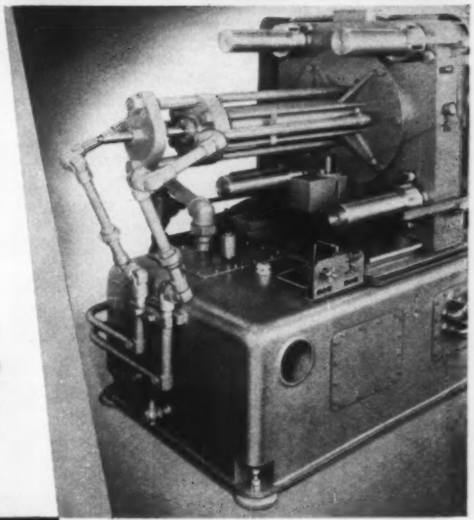
Ask Barry how YOU can protect precision machinery.

Here's the answer

How Did Reed-Prentice Cut Machine Installation Time 60%?

Installation of heavy-duty injection-molding machines *used to be* a tedious job. But Reed-Prentice has licked the installation problem by equipping the newest models of the molding machines they make with Barry Leveling Mounts. With these mounts, the machine can be set anywhere, without special floor surfacing or drilling, can be leveled accurately in just a few minutes, and can be easily relocated to suit changing plant layout needs. Their vibration isolation prevents damage to building and reduces noise transmission; and their shock absorption prevents shifting of machine-control settings.

Ask Barry how YOU can improve production by vibration control.



How Can YOU Gain These Advantages?

It's easy. Write for our plant survey booklet M-156 that tells you where to look for savings in your plant, then talk over your machine-mobility needs and vibration problems with a Barry representative or Barry Mount distributor.

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Before making decisions, management is vitally interested in supplementing its intuitive and crystal-ball thinking with a maximum number of facts about its operations. There has been considerable evidence that these facts can be obtained accurately in production industries only by conveyorization and phases of automation.

Real control of inventory, real knowledge of where the product stands (physically and costwise) at any one time in the manufacturing process, can only be obtained with the help of even, continuous mechanical control.

The future is exciting. Last year, mechanisms were to be revolutionized by electronics and atomic energy. This year, our prophets say that solar energy and water will provide the driving forces before atomic energy comes to full bloom. In the same way, new ideas in conveyors and automatics can make statements of this year look funny in the next. That is all for the good.

Mr. Bucuss . . .

Accelerated progress in better packaging and more economical and safe handling of products will be the pace in 1956. Management's continued recognition of the problems and savings and the increasing number of trained men in the field of packaging and handling will bring about this advancement.

While all industries will benefit by developing improved integrated methods of handling, perhaps the greatest strides have and will be made in steel, nonferrous metals, consumer durables and lumber. Efficient materials handling equipment and complementary products contribute materially to the profitable results in industry.

Mr. Davis . . .

The increasing attention being paid to flexibility and efficiency of yard materials handling is reflected in wider and more effective use of straddle carriers and the side-loading fork truck.

Also outstanding is the continuing trend toward more use of specialized fork truck attachments. Users want to get maximum benefit from the truck on jobs it would do less efficiently, or could not do at all, with forks or ram alone or with more-generalized attachments. Examples:

How Did Wyman-Gordon Cut Out ALL Lost Production Time In Moving a Machine Shop?

The old-timers said it couldn't be done in less than five days — but Barry Leveling Mounts so speeded the reinstallation of lathes, millers, and grinders that the entire moving operation took only a two-day weekend. The vital test-preparation department was ready for work again on Monday morning. The machines set on Barry Leveling Mounts required no drilling of floors, no lagging, no shimming — they were just spotted according to plant layout, and quickly leveled. And because Barry Mounts isolate vibration, the machines do not walk, building-borne noise is reduced, and the accuracy of the precision machines in the Test-preparation Department is protected.

Ask Barry how YOU can cut machine-moving costs.

How Did Bullard Stop ALL Toolroom Rejects Due to Vibration?

With the Bullard Company's toolroom only 50 feet from a main-line railroad track, the vibration from passing trains often caused work spoilage or lost time as grinder operators waited for trains to pass. Moving the toolroom was out of the question. But the seven surface grinders were isolated from external vibration by a simple installation of Barry Leveling Mounts under each machine — at a cost of only $50 per machine. Rejects due to vibration were completely eliminated!

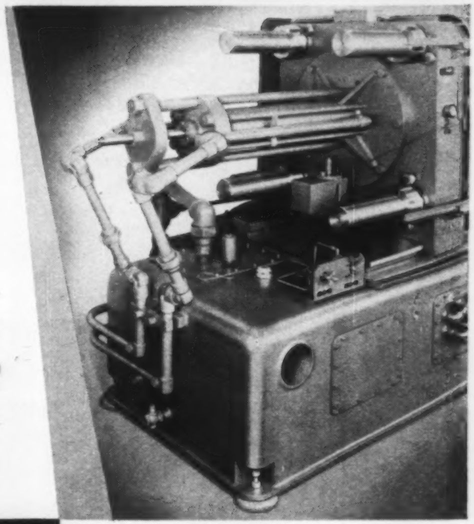
Ask Barry how YOU can protect precision machinery.

Here's the answer

How Did Reed-Prentice Cut Machine Installation Time 60%?

Installation of heavy-duty injection-molding machines *used to be* a tedious job. But Reed-Prentice has licked the installation problem by equipping the newest models of the molding machines they make with Barry Leveling Mounts. With these mounts, the machine can be set anywhere, without special floor surfacing or drilling, can be leveled accurately in just a few minutes, and can be easily relocated to suit changing plant layout needs. Their vibration isolation prevents damage to building and reduces noise transmission; and their shock absorption prevents shifting of machine-control settings.

Ask Barry how YOU can improve production by vibration control.



How Can YOU Gain These Advantages?

It's easy. Write for our plant survey booklet M-156 that tells you where to look for savings in your plant, then talk over your machine-mobility needs and vibration problems with a Barry representative or Barry Mount distributor.

BARRY CONTROLS
INCORPORATED
SALES REPRESENTATIVES IN ALL PRINCIPAL CITIES

BARRY B MOUNT

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New engineering opportunities are open in Barry's expansion program, at all levels in all departments. Send resumé.

thumbs down on high handling costs

A Conco Crane, custom-designed for a specific application, can cut costs sharply. A modest crane investment can return important profits. Let a Conco engineer show you how. Write for a representative to call, or ask for Bulletin 3000A covering the complete Conco Crane line—a line backed by 37 years experience.

CRANES CONCO HOISTS

CONCO ENGINEERING WORKS
Division of H. D. Conkey & Company
70-14th Ave., Mendota, Illinois

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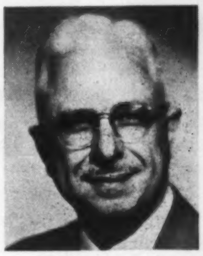
Conco Engineering Works—Domestic Heating Equipment
Conco Building Products, Inc.—Brick, Tile, Stone


EUGENE CALDWELL
Vice President & General Manager
Hyster Co., Portland, Oreg.

Attachments designed to pick up and stack four drums at once, and a forkless attachment for stacking appliances packed in either drum-type cartons or in crates.

New fork truck designs introduced last year showed that major attention is being paid to operational and maintenance problems, with emphasis on improving such factors as visibility, operator comfort, maneuverability and accessibility of components for maintenance.

Mr. Caldwell . . .

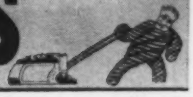
Some potential markets for materials handling trucks are not ready for sales development. An industry must first realize that its methods of handling are unsatisfactory. Sometimes it must reorganize before it can mechanize. Our sales and engineering people work closely with such industries.

We can no longer depend on a "standard" line of equipment. We need to do more specialized selling and to furnish items tailored to meet individual requirements. This condition creates a new set of manufacturing and sales problems. One way of simplifying this problem is to make equipment as flexible as possible, so that it can be readily modified for specialized applications.

Mr. Stringfellow . . .

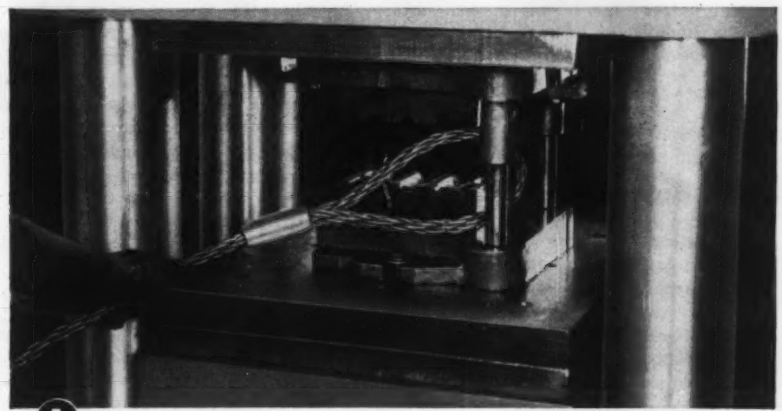
The trend in lift-truck design is toward additional handling devices, such as clamps for picking up unskidded loads, tilting mechanisms for

Tuffy® SLING NEWS



Vol. 1 Published Monthly in Leading American Trade Magazines by Union Wire Rope Corp. **No. 2**

NEW Tuffy® FERRULE GIVES EYE SPLICE STRENGTH OF Tuffy® SLING FABRIC



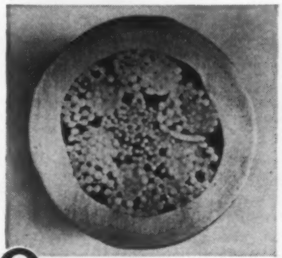
① **TREMENDOUS PRESSURE** of this machine in swaging Tuffy's smooth-edged metal ferrule around the tuck splice virtually flows the metal into the braided fabric interstices.

No Increase in Cost For Smoother, Safer Factory Ferrule Splice

In the most important sling development since Tuffy machine braided wire was introduced, Tuffy now offers sling users greater safety, faster sling handling, and more sling-eye strength—at no increase in price.

It's all made possible by a new steel ferrule used on all Tuffy Slings. This ferrule, slipped over the splice of the eye and pressed on under great pressure, holds so tight that it gives the eye of the sling 100 per cent of the strength of the machine braided wire fabric. The tucked-in splice is completely covered—the swaged ends of the ferrule leave no abrupt edges to catch on loads or to injure workers' hands.

Teamed up with the Tuffy machine braided sling fabric, this new ferrule makes Tuffy the sling handler's favorite for every job.



② The force of friction set up by compressing the ferrule metal on more of the wire fabric surface forms an eye that really stays spliced.

Good Man To Know— Your Tuffy Distributor

Tell him your requirements. Then let him save you the time, trouble, and money of carrying an inventory. He will stock the Tuffy Slings you want and Tuffy Hoist Lines to team up with your Tuffy Slings.

Tuffy
Sling
HANDBOOK
SL-NO. 2

New Tuffy Sling Handbook FREE — Mail Coupon Now

This big 60-page book tells you all about new factory-fitted Tuffy Slings with our pressed-on ferrule and contains complete information about a full line of factory-fitted Tuffy Slings, nearly a dozen new standard fittings, and complete data and charts on all Tuffy Slings. It also has a brand-new engineer's notebook and a valuable rigger's manual. Send for your copy now. No obligation.

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G. E. STRINGFELLOW
Vice President, Storage Battery Div., Thomas A. Edison Inc.
W. Orange, N. J.

R. F. RICE
Manager, Crane Dept.
Whiting Corp., Harvey, Ill.

operating scoops and bins for receiving and dumping bulk commodities or small parts handled in bulk.

While these and other similar devices increase the versatility and efficiency of the trucks, the end result is a need for more operating power. In our own case, we are meeting this need by the development of batteries that provide more capacity relative to their physical size, and by making available to users the services of our field engineers to conduct duty-cycle surveys.

For trucks in multiple-shift operation, we are developing more compact battery assemblies in demountable steel boxes to increase the ease and speed of exchanging batteries between shifts.

Mr. Rice . . .

Overhead traveling cranes are being selected for specific jobs. Features are wanted which will give the best service at the lowest over-all cost. One important trend: Magnetic controls to reduce maintenance expense and provide accurate speed regulation.

Special emphasis is placed on antifriction bearings. Mechanical parts of superior quality, such as heat treated gearing, hardened wheels and steel drums, add to the life of the crane.

Cab designs are being improved to give a more pleasing appearance and better vision for the operator. Crane users appreciate the advantages of adequate safety devices. To assure uninterrupted service, many cranes are equipped with one-shot lubricating systems.

Some applications are being studied to eliminate the operator and arrange the crane control to carry out a sequence of motions after receiving the starting signal. An overhead crane may be made to perform automatically for many types of repetitive materials handling.

Mr. Keplinger . . .

The production of steel shipping containers for 1956 will be somewhat higher than last year. The sale of drums made of 18-gage and heavier steel has not increased in proportion

CONVEYOR ST ARDIZAT

to the gains made in lighter-gage containers. The reason is one of economics: Under certain conditions, containers made of 18-gage or heavier steel can be cleaned and reconditioned for re-use.

Probable annual volumes for 1956: 18-gage and heavier drums, 24,500,000; 19-gage and lighter, 9,500,000; pails, 80,000,000.

In estimates made for total production of steel shipping containers in 1956, consideration must be given to the increasing demand for sheet steel and the resultant growing shortage.

Mr. Davies . . .

There is a move toward more complete integration of handling techniques and the ideal of "one-time" handling. This will be done with more versatile equipment and new handling systems.

The trend toward industrywide use of the straddle carrier (an example of "one-time" handling) will become stronger. Systems like Clark's Mobilvan and "piggyback" will get more and more attention, because they offer the means for eliminating many intermediate handling functions. This means lower costs.

Individual handling tools will be evaluated from a new angle. Forklift trucks, towing tractors and other manually operated machines will be designed with emphasis on speed, safety and operator comfort, rather than on muscle power alone.

Mr. Sollenberger . . .

The next ten years should see more technological developments than we have had in the last two centuries. Conveyors will play their part in production and distribution. There still is a large area for the improvement of materials handling facilities and systems in older plants.

Distribution costs are almost entirely handling costs, either direct or indirect. Well-planned, mechanized handling systems in which conveyors will play a major role can aid materially in cost reduction.

In prospect are even greater safety and a minimum of operator effort. This will be made possible by extended use of automatic control

LIVINGSTON KEPLINGER
Steel Shipping Container
Institute Inc., New York

R. H. DAVIES
Vice President, Industrial Truck
Div., Clark Equipment Co.
Battle Creek, Mich.

Now you can buy CUSTOMIZED conveyors in pre-fabricated STANDARD sections

In a **single glance,** you can see all of the advantages of MAY-FRAN STANDARDIZED components.

The five standard sections shown can be assembled to form virtually any type of *"customized"* conveyor for the handling of stampings, formed metal parts, forgings, automotive scrap, chips and turnings.

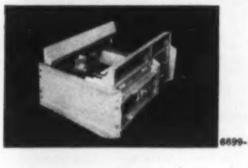
Straight sections . . . concave or convex sections . . . take-up charge and discharge-end sections can be furnished to meet specific requirements of belt width as well as load bearing and volume capacities.

A single glance at the MAY-FRAN conveyor standardization program, and you will see savings never before possible. In addition you will see unsurpassed conveyor flexibility.

MAY-FRAN . . . a name long recognized in the materials handling field . . . is **FIRST** again with *standardized* components for your *customized* installation.

Write today for complete information.

. . . AUTOMATION . . . . AND YOU!



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BUSCHMAN offers a wide range of types and sizes to cover widely diversified materials handling applications. Gravity roller and wheel . . . live roller . . . powered belt . . . apron . . . overhead cable . . . or special conveyors can be supplied. In addition, BUSCHMAN engineers are prepared to survey your plant and to recommend the most practical, economical and efficient type of conveyor for each installation.

Whatever your materials handling requirements . . . specify BUSCHMAN for durable, versatile, profitable conveyor systems.

BUSCHMAN-designed switch and spur sections provide maximum versatility.

Typical combination system utilizing live rollers and gravity wheels.

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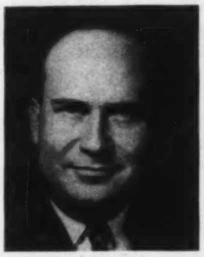


R. C. SOLLENBERGER
Executive Vice President, Conveyor Equipment Manufacturers Association
Washington

L. M. SEARS
Chairman of the Board
Towmotor Corp., Cleveland

and manual control from remote points. Mechanical and electrical feedback principles, radio, industrial television, servomechanisms and other devices will be utilized.

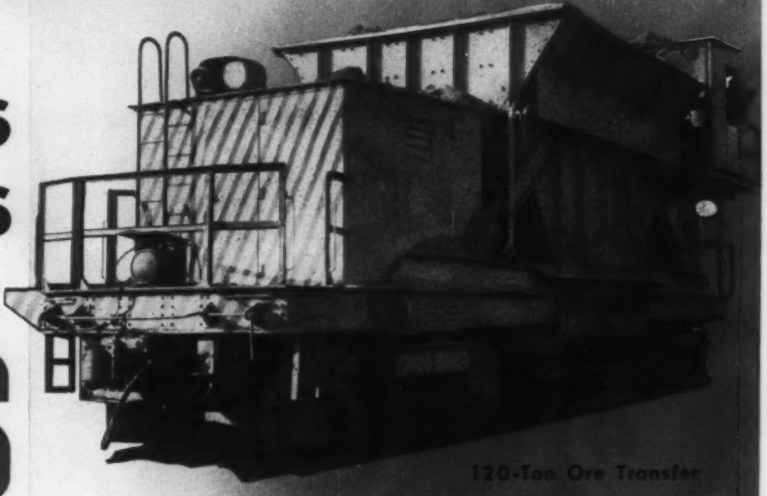
Mr. Sears . . .

Competitive conditions in 1956 will require producers and distributors to purchase handling equipment on a more selective basis than ever before. This will favor fork lift trucks, because of their high flexibility and lower cost.

In consumer goods plants, merchandise from constant production piles up until it can be distributed according to seasonal demand or promotional plans. Only fork lift trucks can handle the peak loads which must be stored quickly and brought out of storage with equal speed. In other industries, fork lift trucks handling high-weight palletized unit loads are as efficient as systems providing constant flow of smaller units. They also provide the capacity to perform many other functions within the plant and require a smaller capital investment.

DEPENDABILITY

that
MAINTAINS
SCHEDULES

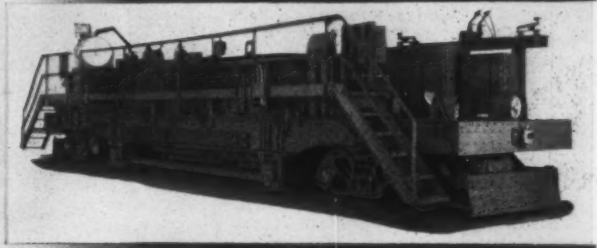


120-Ton Ore Transfer

ATLAS

ORE TRANSFERS AND SCALE CARS

Atlas Scale Cars and Ore Transfers are ruggedly built to withstand overloading and continuous steel plant service. Each car is engineered to the service specifications of the user so that low maintenance, safety, and dependability are assured.



30-Ton Double Hopper Scale Car

SAFETY-TYPE TRANSFERS — Intra-Plant transfers with single safety-type control for handling heavy materials between buildings, serving parallel crane runways. Illustrated, 64-ton capacity coil transfer car. Ask for Bulletin 1283.

Manufacturers of Ore Transfers • Scale Cars • Coal Charging Cars • Coke Quenching Cars • Coal and Metal Mining Storage Battery Locomotives.

The ATLAS CAR & MANUFACTURING Co.
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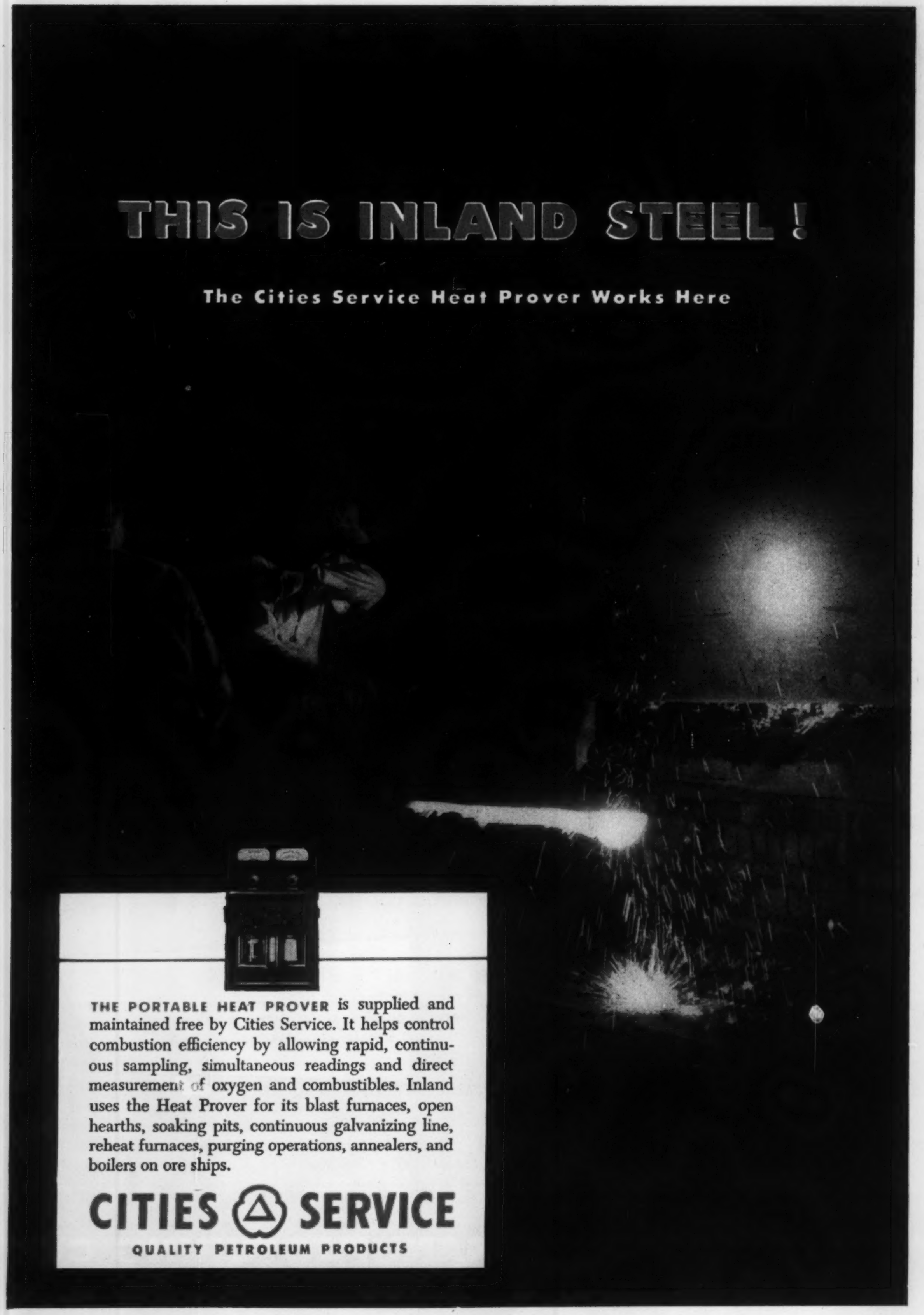

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The Cities Service Heat Prover Works Here

THE PORTABLE HEAT PROVER is supplied and maintained free by Cities Service. It helps control combustion efficiency by allowing rapid, continuous sampling, simultaneous readings and direct measurement of oxygen and combustibles. Inland uses the Heat Prover for its blast furnaces, open hearths, soaking pits, continuous galvanizing line, reheat furnaces, purging operations, annealers, and boilers on ore ships.

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M. M. GURGO
Sales Engineering, Esso Standard Oil Co., New York

JOHN R. McCOY
Mgr., Technical Service, Houdaille-Hershey of Indiana Inc. Lebanon, Ind.

LUBRICATION

FORUM ON TECHNICAL PROGRESS

The search continues for more multipurpose lubricants . . . automatic lubrication goes hand-in-glove with automation . . . better soluble oils are about to enter the picture . . . better heavy-duty gear oils are here . . .

Mr. Boyd . . .

Maintenance-free soluble oil for automation is the most important promise of the immediate future. Some of these compounds already have passed the development and test stages and are in use.

The biggest problem in automation is stoppage of the entire line by a small point of failure caused by inadequate soluble oil.

New methods of research in the field of tool lubrication have resulted in some successful new compounds for automation setups. More will follow.

A wider variety of chemicals is available today for the development of new cutting compounds that will prevent the accumulation of chips, hard gummy deposits and buildup on tools. These new compounds will also give longer tool life at higher speeds.

The year ahead should also see more titanium grinding at faster speeds. In the past, it has been ground at lower than normal speeds. The wide use of conventional speeds will be possible with special grinding fluids.

Mr. Dunham . . .

There has been an increasing tendency to make use of chemical additives to further enhance the lubricant functions of industrial lubricants. Great strides have been and are being made in refinery methods which improve the quality of base lubricants. These improved refining methods, supplemented by chemical additives, have offered industry greatly improved lubricants, particularly from the standpoint of chemical stability, antirust and anticorrosion, detergent dispersant action, antifoam characteristics, etc.

Machine builders have incorporated centralized lubrication systems on machines to automatically lubricate vital parts and eliminate the human element. More stable oils are required for these methods than the old, once-through application methods.

It is reasonable to believe that lubricant technology will advance to supply more multipurpose oils and greases. This will aid industrial plants in keeping the number of lubricants to a minimum that is consistent with good operating practices.

Mr. Gurgo . . .

Greases approaching all-purpose types are being introduced. Their extensive field use will reveal areas for further development.

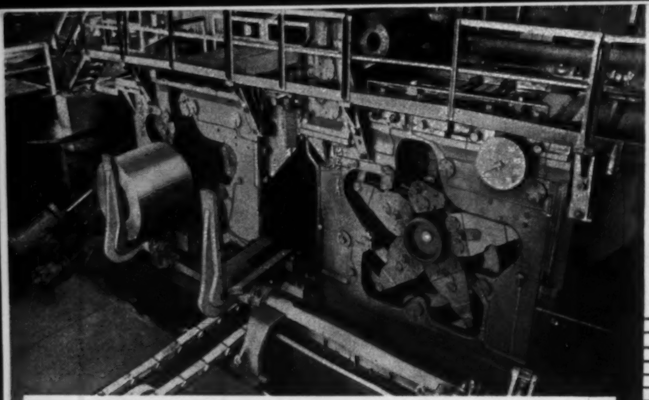
Greases have been satisfactory for various component parts of equipment. However, combinations and modernization of equipment, coupled with increased production, have upped loads and speeds. This requires a lubricant that combines many of the outstanding characteristics found in existing products.

The ultimate aim would be an all-purpose grease; continued research work along these lines has indicated that products of this type are feasible. An all-purpose grease would have to incorporate many characteristics: High and low-temperature performance, long service life, extreme-pressure characteristics, water and steam resistance, resistance to consistency change at high and low rates of shear, good sealing characteristics, frictional characteristics suitable for high and low speed operations and should be moderately priced.

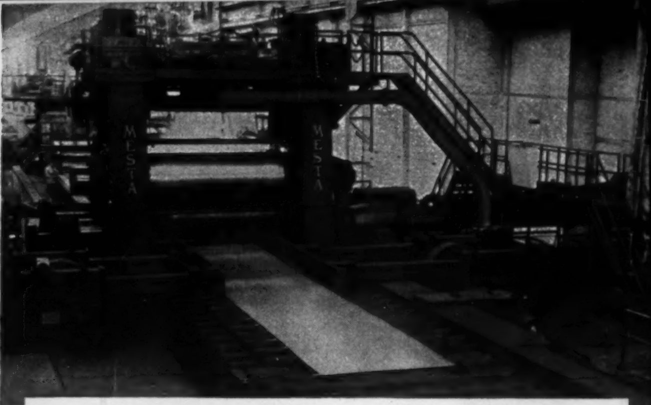
Mr. Mc Coy . . .

Planned preventive maintenance can keep machinery running and production at a high level. Machinery can be properly lubricated only with clean oil. It has been proved that the major cause of trouble developing in hydraulically actuated machinery is dirty oil. In metalworking operations, keeping the coolant clean will result in higher production, better finished products, less rejects, less tool grinding and wheel dressing and longer coolant life. Engines operating continuously on clean oil require considerably less maintenance and afford longer oil life.

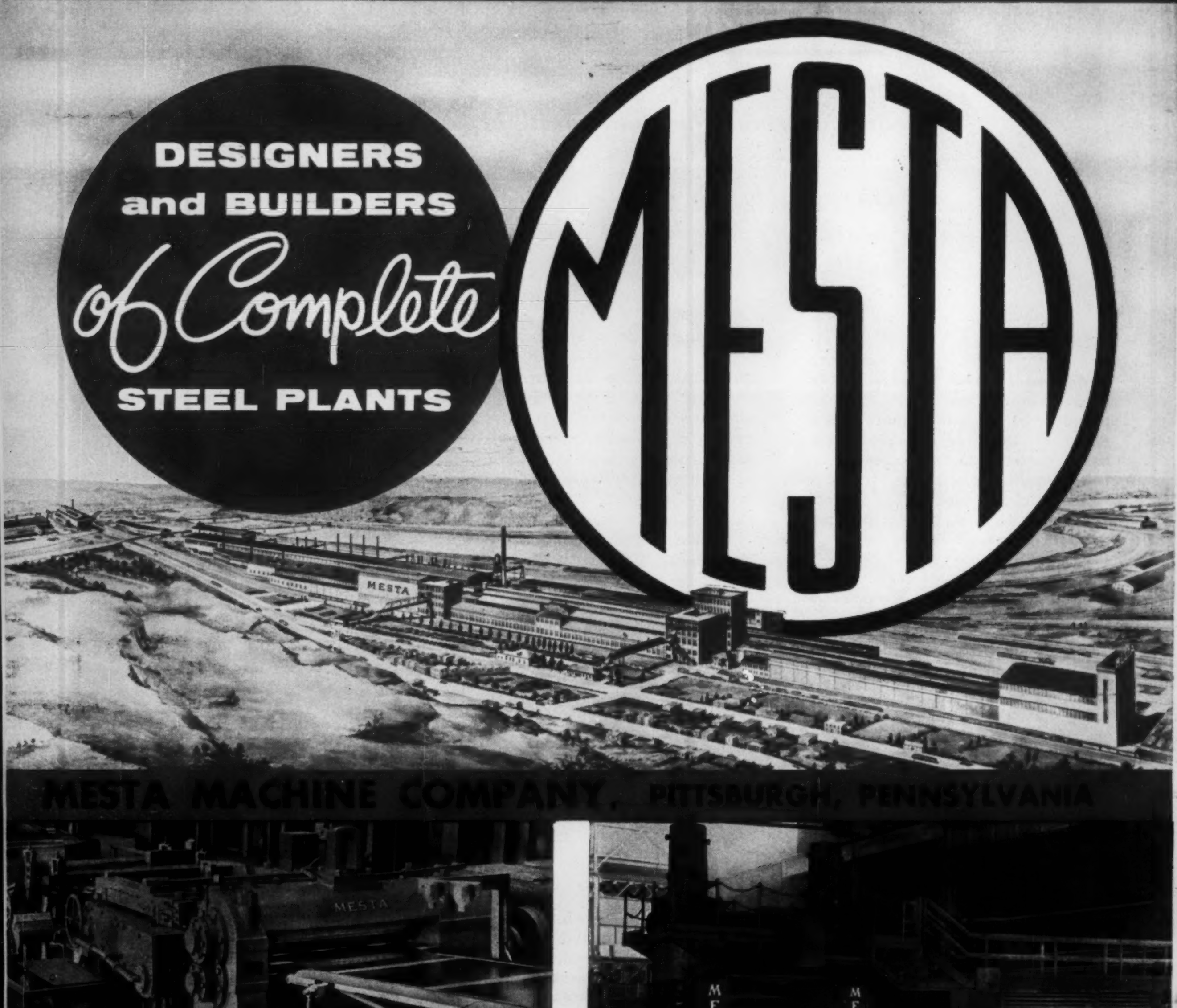
Changing oil or coolant at frequent



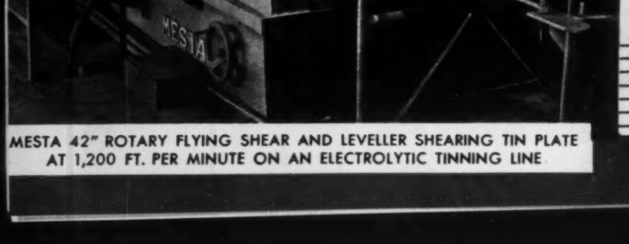
DOWN COILERS WITH ROTATING AND EXPANDING MANDRELS
ON A MESTA 60" HOT STRIP MILL


MESTA
MESTA

MESTA 132" FOUR-HIGH REVERSING PLATE MILL


DESIGNERS
and BUILDERS
of Complete
STEEL PLANTS
MESTA
MESTA

MESTA MACHINE COMPANY, PITTSBURGH, PENNSYLVANIA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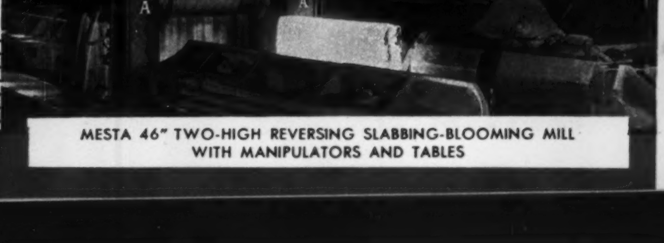
MESTA 42" ROTARY FLYING SHEAR AND LEVELLER SHEARING TIN PLATE
AT 1,200 FT. PER MINUTE ON AN ELECTROLYTIC TINNING LINE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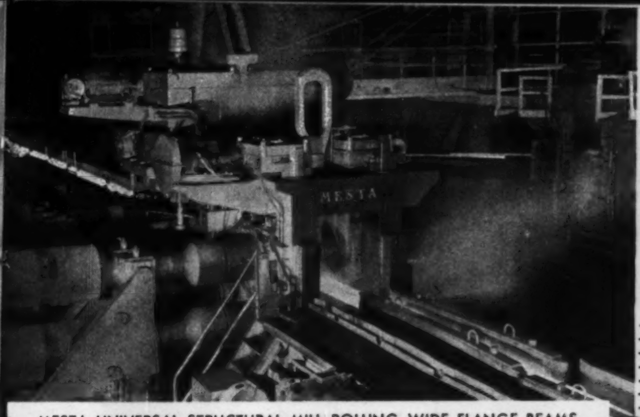
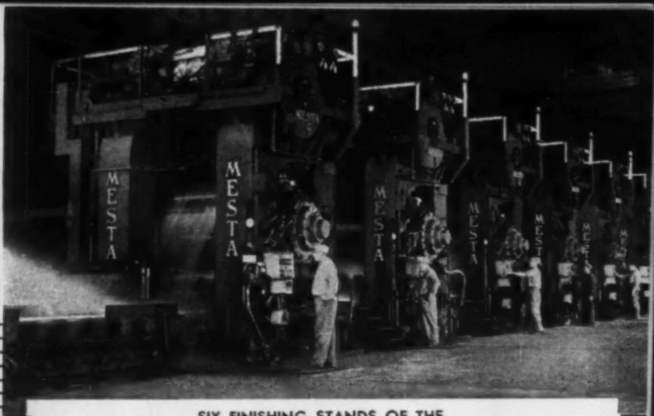
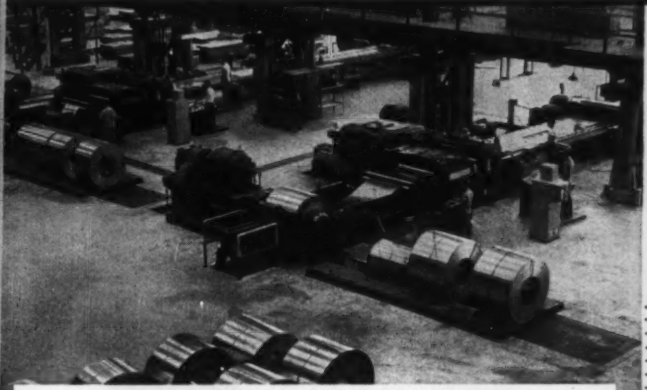
MESTA 46" TWO-HIGH REVERSING SLABBING-BLOOMING MILL
WITH MANIPULATORS AND TABLES



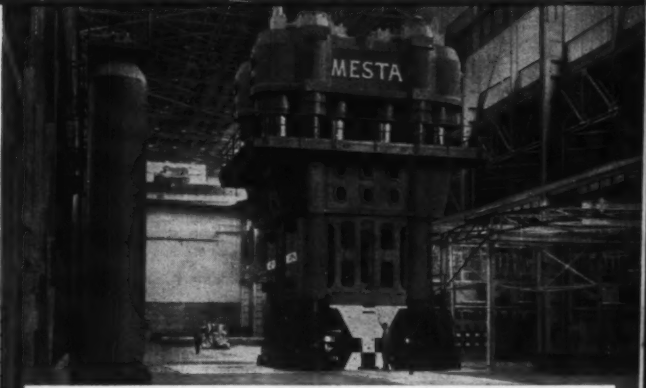
MESTA UNIVERSAL STRUCTURAL MILL ROLLING WIDE FLANGE BEAMS ON THE 44" UNIVERSAL STAND AND 34" EDGING STAND



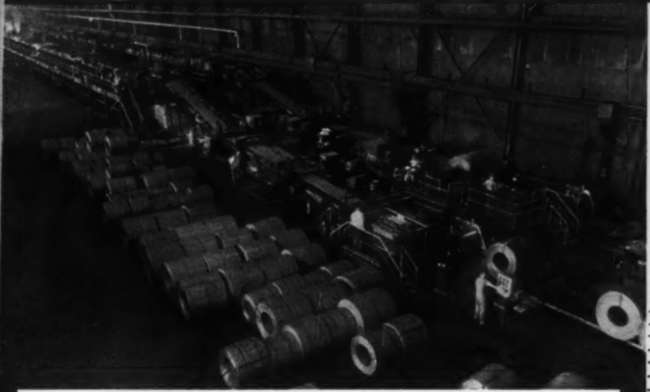
SIX FINISHING STANDS OF THE MESTA 60" FOUR-HIGH HOT STRIP MILL



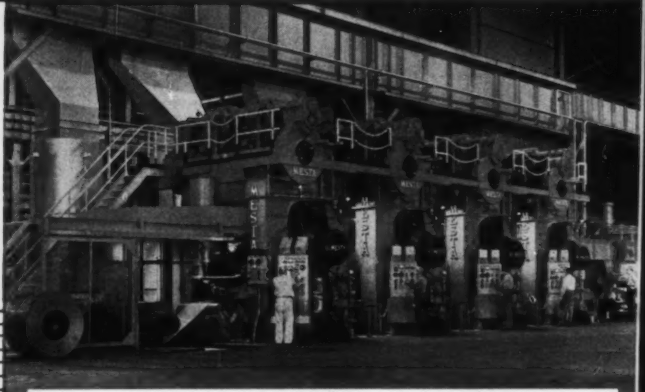
MESTA 60" SHEET SHEARING LINES WITH TRIMMERS AND COMBINATION ROTARY FLYING SHEARS AND LEVELLERS



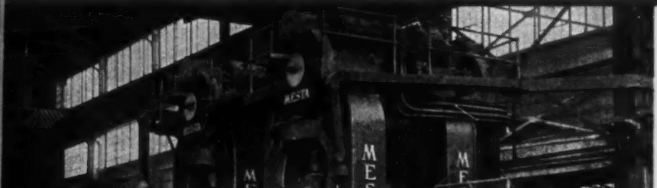
MESTA 50,000-TON HYDRAULIC FORGING PRESS



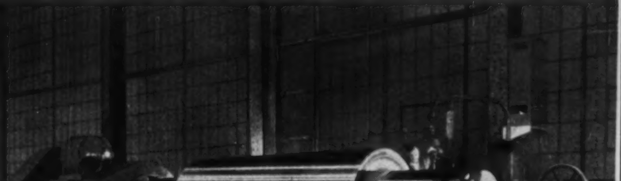
MESTA 60" CONTINUOUS PICKLING LINES



MESTA 56" FOUR-HIGH FOUR-STAND TANDEM COLD MILL



MESTA 42" FOUR-HIGH TWIN-STAND SKIN PASS MILL



MESTA HEAVY-DUTY TRAVELING WHEEL TYPE ROLL GRINDER FINISHING A 59" X 154" MESTA BACKING-UP ROLL

ALEX P. FOX
President, Lincoln Engineering Co.
St. Louis

E. L. H. BASTIAN
Senior Engineer, Shell Oil Co.
New York

OWEN A. WILLIAMS
Mgr., Plant Engineering Office
Ford Motor Co., Dearborn, Mich.

W. W. SCHEUMANN
Vice President, Cities Service
Research & Development Co.,
New York

C. T. LEWIS
Chief Lubrication Engineer, Republic
Steel Corp., Cleveland

intervals is not the complete answer. Oil must be kept continuously clean. This can be done only with proper filters. Filter development has kept pace with new machine and engine development.

Mr. Fox . . .

Competitive production advances must be used in these days of diminishing profit margins. No plant can afford to operate without them. You can't be content with methods of application that were the best to be had 25 years ago. Faulty lubrication can cause excessive bearing replacement, spoilage of goods in process from dripping lubricant, needless power consumption and a host of other elements that were considered a part of doing business. Far superior methods not only are available, but have been thoroughly researched, tested and are in use by many of the country's most aggressive companies.

Almost incredible profit advantages of power lubrication systems are available. They have obsoleted the need for tedious and intricate lubrication record-keeping systems with their attendant time and cost-consuming disadvantages.

Mr. Bastian . . .

Cutting fluids, particularly coolants, are receiving increasing attention.

New types of water-based fluids which combine excellent cooling properties with machining abilities heretofore associated only with cutting oils have been, and are being, developed rapidly to meet the needs of industry.

Production results with certain of these fluids, in relatively dilute aqueous concentration, have shown remarkable promise for increasing production capacities of many machine tools.

Based on progress to date, further advances in development of even better cutting fluids appears likely, judging from general industry interest.

Mr. Williams . . .

Today's automatic production operations require improved lubrication techniques.

Primarily, equipment builders engineer their products to perform specific production operations, placing only minor emphasis on the application of lubricants. Individual oil cups and grease fittings do not answer the lubrication needs of today's complex machinery. Something as vital to continued operation as lubrication should be given utmost consideration during design.

While some progress has been made in the development of improved integral and auxiliary central lubricating systems, there is much to be desired.

Joint Industry Conference standards have been instrumental in promoting progress along electrical, hydraulic and pneumatic machine component lines. Standards of this type acquaint suppliers with the problems and needs of the users, enabling the suppliers to work toward satisfying these needs in future design improvements. Similar standards are needed for lubrication.

Mr. Scheumann . . .

Industry is looking to the lubrication engineer to provide products that prevent metal failures due to wear and abrasion. These problems have become more acute with the recent trend toward higher speeds and stresses in industrial and automotive engines.

The trend to reduce the number of products required to lubricate equipment in industrial plants is continuing. Multifunctional oils and greases are being produced. Fewer types of lubricants are being stocked.

Turbine oils with good load carrying characteristics are being developed to lubricate more heavily loaded gears. Newcomers are: Quenching oils for steel mill application to provide quicker and more uniform quenching, cutting oils for longer tool life, gear oils for longer gear life, wire rope lubricants with E.P. characteristics and improved low temperature adhesion characteristics, new and cheaper satisfactory engine oils and a host of other industrial petroleum products.

Mr. Lewis . . .

Application methods, along with lubricant additive developments, will be the key building blocks in lubrication advancement.

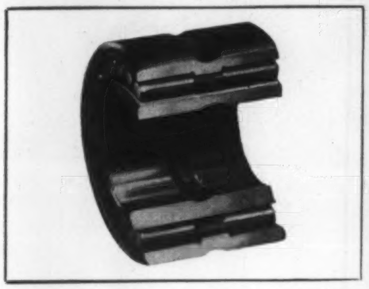
With systems available to deliver either greases or oils or oil-mists, many applications are changing to more efficient methods.

Development work has brought about the high-viscosity, index-lubricant blends which have been used not only by the armed services but in some of the more recent iron ore developments in the northern part

BEARING TIPS by McGill

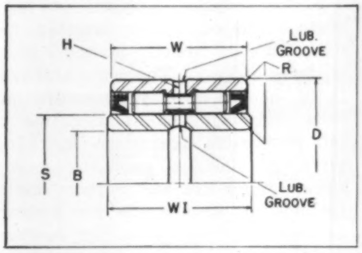
CAGELESS BEARING CORRECTS SKEWING

Guiderol Bearings carry greater loads in smaller spaces because they have no space wasting cages. A full complement of center grooved rollers extends the width of the race for maximum load support and a center guide rail avoids roller skewing that can bind a bearing under some loads. MT and CT series interchange dimensionally with ordinary needle bearings and cylindrical roller bearings.



First Sealed Full Type Roller Bearing Series

The SG series Guiderol bearing provides low-cost and flexible sealing where ordinary needle-type bearings with auxiliary seals have been too cumbersome and expensive. Interchangeable with the standard Guiderol bearing, the new SG series provides five sealing combinations.



140 Pages of Bearing Facts

Write for your copy of Catalog No. 52, a revised 140-page Bearing Selection Guide. It contains vital product information and 30 pages of engineering data.

GUIDEROL® BEARING CARRIES GREATER LOAD IN SMALL SPACE FOR McCULLOCH CHAIN SAWS

Bearings installed in 1944 still in use.

Load-carrying capacity in minimum space is given as the reason for using McGill Guiderol bearings on the heavy-duty loader made by the Farmhand Company. Four bearings support the shafts of the gear pump that furnishes hydraulic power to the loader. Guiderol bearings have been used by Farmhand since 1944 and virtually all of the loaders with the original bearings are still in use.

Assembly ease cited as an extra benefit

Rugged use in the field dictates rugged construction at the factory for McCulloch Motors Corporation gasoline engine chain saw units. The one-man and two-man chain saws must be light and compact but sturdy enough to operate at full capacity all day long.

Since switching to a McGill Guiderol Bearing as support for the crankshaft, McCulloch, like many machine builders, has proved that the Guiderol bearing provides the desired greater load capacity in small space and outlasts former units with minimum maintenance—important under rugged chain saw field conditions.

A bonus benefit is the ease of installation of the Guiderol bearing—with open ends and no end shoulders. Assembly is a simpler operation.

Insure performance with McGILL® MULTIROL® GUIDEROL® CAMROL

Full Type Roller Bearings

McGILL MANUFACTURING COMPANY, INC., 301 N. LAFAYETTE ST., VALPARAISO, INDIANA

Logan Roller Conveyor speeds production in this prominent diesel engine plant. Engine parts are handled quickly and easily through successive machining and inspection operations. Here cylinder heads are fed via curve in foreground to washer, then water-tested on line in rear.

The LEADERS use Logan

Large business or small . . . you can be a leader in your field, with a properly equipped plant. The nation's foremost industries use Logan Conveyors as part of their equipment for (a) greater speed in production, (b) greater capacity in the same plant, (c) the ability to make quicker deliveries, (d) the conservation of man power, (e) the maintaining of satisfaction among workers. Put Logan to work for you, too. Write for nearest engineer or for further information.

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Logan Conveyors

A. R. BLACK
Product Application Department
Shell Oil Co., New York

L. O. WITZENBURG
General Sales Manager, Farval Corp., Cleveland

of the country. They are being presented as multigrade oils for use in our passenger automobiles.

Mr. Black . . .

Antiwear turbine and gear oils have been developed which lengthen the useful life of heavily stressed tooth surfaces of gears. The same antiwear features built into hydraulic oils and other lubricants make available to industry extra protection for hard-working machine parts. The oils mean longer life and reduced maintenance for spur gears and hydraulic pumps. They give the machine designer a factor of safety when surfaces are called on to transmit heavy loads. They carry the surfaces safely through the running-in stage, so critical for new machinery.

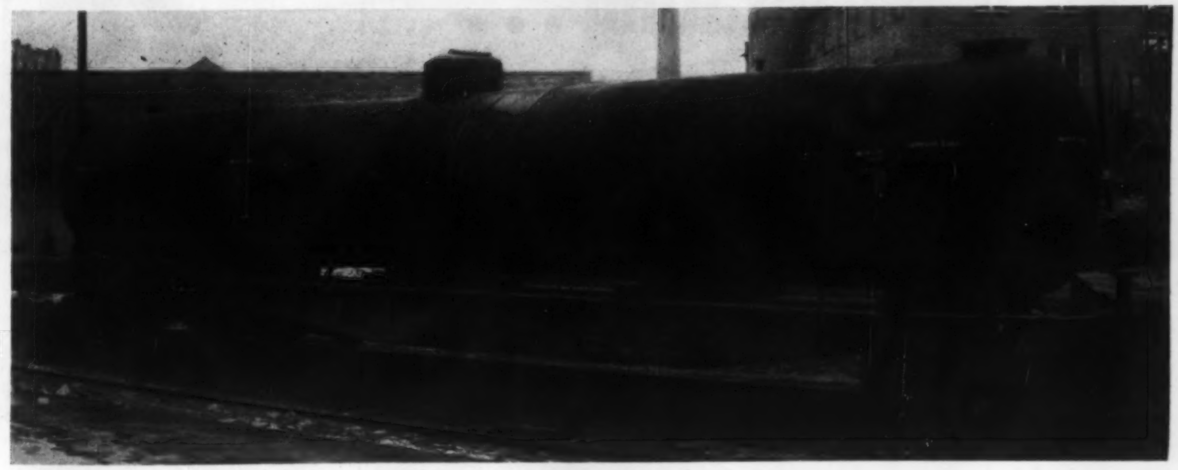
Mr. Witzenburg . . .

An improved method to spray-lubricate bull gears, girth gears and other spur or herringbone gear trains is one of the most important new developments.

Self-contained spray panels are fastened to the gear housing or framework. The valve utilizes air

HERESITE

REG. U. S. PAT. OFFICE



Pictured above is a ten foot diameter by sixty foot long carbon steel tank being shipped from our plant after Heresite lining. This tank was lined for the storage of sulphuric acid that must be kept free from iron contamination. Many of our customers depend on Heresite coatings to keep their products free from contamination during manufacturing, storage, and shipping.

The coatings also prolong life and prevent costly replacement of equipment due to corrosion.

HERESITE & CHEMICAL COMPANY

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or if you would like more information on how perforating can enhance the sales appeal of your products, get in touch with Hendrick today.

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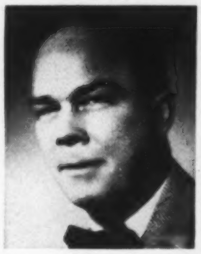

W. P. YOUNGCLAUS JR.
Administrative Secy., American Society of Lubrication Engineers, Chicago

pressure at intervals to spray the gears through its attached nozzle. The gear lubricant is delivered to the spray valve in measured amounts through a standard metering valve.

Central pumping units, either manual or automatic, deliver the lubricant to the spray panels. These pumps may be located at considerable distance and are usually time-clock operated with suitable safety and warning features to insure continuous trouble-free service.

The lubricant is sprayed directly onto the pressure side of the gear teeth in proper quantities to insure adequate lubrication but without danger of building harmful deposits of hard lubricant at the tooth root.

Mr. Youngclaus . . .

The lack of accurate maintenance records is finally being corrected. Modern bookkeeping systems provide necessary data to evaluate results of preventive maintenance programs. These new cost records allow corporations to see what their over-all maintenance costs are (based against the capital investment in their plants). For the first time, they can see the tremendous savings brought about by new methods and products.

The lubrication industry—bearing manufacturers, petroleum companies, chemical manufacturers and laboratories of the technological schools—have inaugurated intensive research programs to improve products, methods and field practice. But until the proper records were kept, visible savings were relatively small.

Recently, one major steel producer found itself in a position to compare present costs with those in 1953. Its preventive maintenance program had cut maintenance costs by $3.5 million in 1954.

High Production of Automobile Crankshaft Forgings on AJAX *High Speed* Forging Presses

Production
More than Doubled
Over Former Methods
on 6000 Ton
Ajax Forging Presses

Crankshafts
With Less Draft
on Counterweights
for Lower Machining
Costs

For Your
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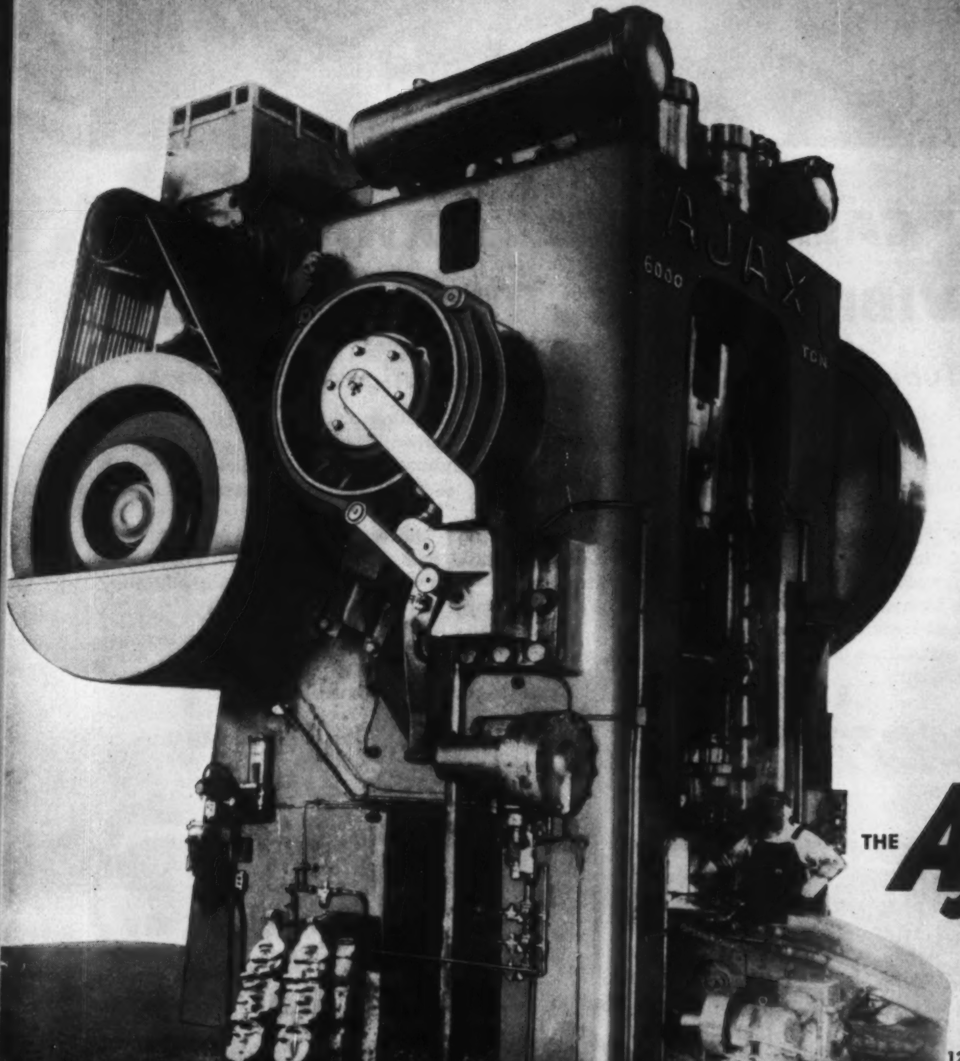

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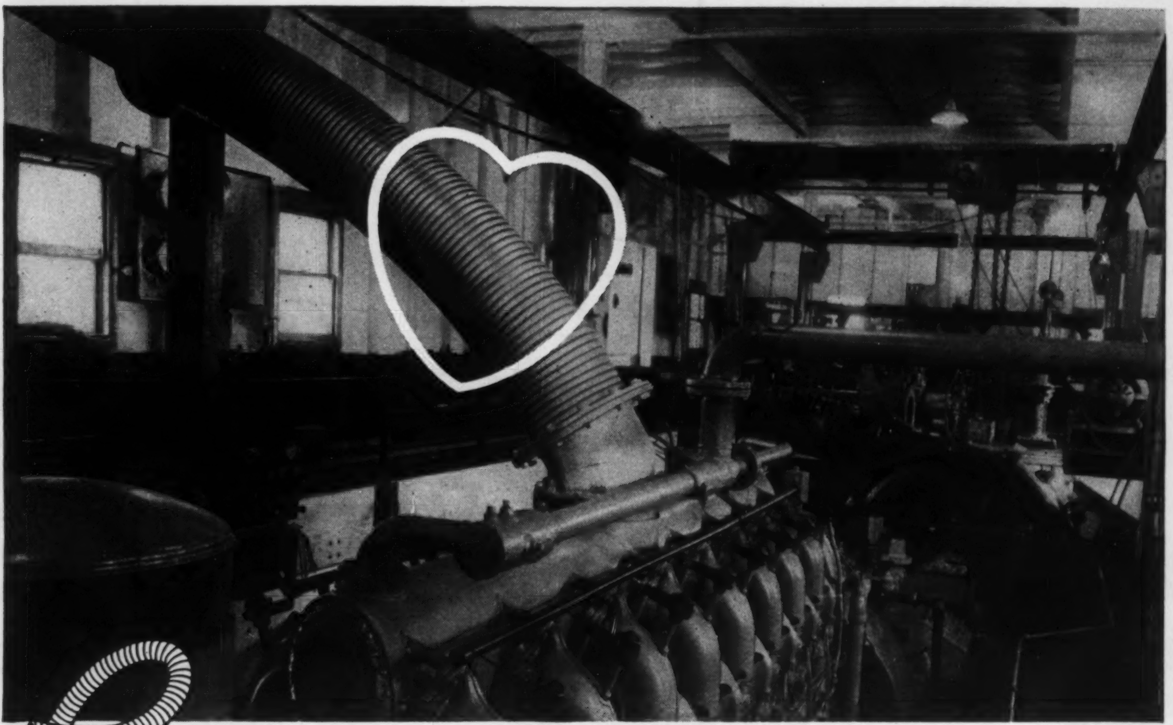

Penflex CALMS DIESEL EXHAUST . . . ABSORBS VIBRATION . . . REDUCES NOISE

Flexible Tubing is Leak-proof, Rugged, Fatigue-free

When this big diesel starts the power she really purrs . . . No nerve shattering exhaust vibrations . . . overheated operating conditions . . . or shutdowns for broken pipes. The engineers solved these problems with one length of Penflex interlocked 14" tubing.

Penflex exhaust tubing is as tight as a pipe . . . but flexible. It flexes to soak up vibration. It dissipates the heat to prevent overheating. Its four-wall interlocked construction keeps gases tight as a pipe from exhaust port to stack.

Throughout industry on diesel installations—exhausts, air intakes, fuel, lubricating or water lines there's a Penflex tubing to increase operating efficiency. Penflex makes a complete line of four-wall, interlocking and seamless welded corrugated tubing, including braided wire or rubber covered types . . . ⅛" to 24" I.D. in materials suited to various conditions.

Let "Flexineering"—the science of selecting tubing of the right size, weight, type and construction for your particular installation—help you step up operating efficiency. Write for your copy of "Flexineering" today.

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W. O. VEDDER
Manager, Dust Control Dept. Pangborn Corp., Hagerstown, Md.

S. W. GIBB
Vice President, C & D Batteries Inc., Conshohocken, Pa.

RICHARD RUE
Technical Director, Insul-Mastic Corp. of America, Summit, Ill.

SERVICE AND MAINTENANCE

FORUM ON TECHNICAL PROGRESS

Foam-water sprinklers give double protection . . . safety programs pay off . . . space heaters obsolete the boiler plant . . . improvement in dust and fume control . . . coal tar-epoxy resin coatings hit market . . .

Mr. Shideler . . .

Future emphasis in protective coatings will be placed on improvement in formulation and the selection of better materials for improved corrosion resistance and application characteristics. The trend continues in the direction of thicker application of industrial coatings.

Newer-type protective coatings include the epoxy resin and the coal tar-epoxy combinations. Synthetic rubber and coal tar combinations are gaining interest.

Epoxy resin coatings are being tested extensively in the oil and gas industry, primarily for the internal lining of steel pipelines. They also are being used on various industrial applications. Most of these coatings take the form of the catalytic setting type. The coal tar-epoxy coatings are just beginning to reach the market. This combination will be further developed to meet severe corrosion requirements in industry.

Mr. Vedder . . .

Developments in industrial dust and fume control have been chiefly in the refinement and modernization of basic equipment. The aim is to increase over-all effectiveness and reduce operating and maintenance costs.

Equipment functioning on established principles has been modified, extended or combined for better control of higher loadings, finer particles, higher temperatures, etc. In many cases, the salvage value of recovered materials has contributed substantially toward returning the original investment.

Effort and study continues on methods, apparatus and instrumentation for air pollution determination and measurement, dust sampling and particle size determinations which will give accurate, reproducible results and are less complicated in field use.

Mr. Gibb . . .

Batteries for mobile industrial equipment must provide maximum electrical capacity in the minimum practical space. Substantial progress has been made. Two widely used, cycling-type batteries have been rated at 50 and 100 ampere hours (respectively) per positive plate. Through improvements in design and construction, their capacities are being increased to 66 and 125 ampere hours —a gain of 25 per cent—while maintaining standard dimensions. In terms of mobile equipment use, this means an equivalently longer duty cycle.

On stationary batteries, widely used for switchgear, control, telephone and similar service, a continuing research program has been directed at improved life and reduced cost. The results of this work are reflected in the lead-calcium battery, which offers a projected effective life of at least 20 years at a major reduction in capital investment.

Mr. Rue . . .

A new, fire-retardant, insulating mastic can replace the costly poured concrete forms around beams, pipes and stanchions used to support pipelines. The coating effectively adheres and insulates the surface to which it is applied. After 30-minute exposure to a 2000° F flame, the temperature of the metal's surface will be under 1000° F.

Insul-Mastic No. 5501 can be spray applied with conventional mastic equipment to thicknesses of ¼ to ⅜-in. on metal and other surfaces. A fire and heat-retarding coating, it combines corrosion protection, insulation, and extreme durability.

The mastic has great potential in industry where tanks, reactors, overhead pipes and lines are holding or transferring fire hazardous materials.

Mr. Power . . .

Fire protection should go hand in hand with plant design and process planning. Automation and a resulting reduction of personnel per unit area emphasizes the need of com-

J. J. POWER JR.
Executive Vice President, Automatic Sprinkler Corp. of America
Youngstown

O. C. HOGNANDER
Vice President & Sales Manager
G. H. Tennant Co., Minneapolis

W. L. DAVIDSON
Sales Manager, Machinery Div.
Dravo Corp., Pittsburgh

R. T. PRING
Technical Director, Dust & Fume Control Div., Wheelabrator Corp., Mishawaka, Ind.

J. T. RYAN JR.
President, Mine Safety Appliances Co., Pittsburgh

plete automatic fire protection.

A fast-growing development in protection equipment is the new foam-water sprinkler system. It combines foam flooding for flammable liquid fires with standard deluge protection. It is completely automatic and can be adapted for large areas or difficult-access areas.

Progress in electronic detection methods is rapid. With the detection methods already available, plus new ones being developed, fire protection systems can be operated from almost every conceivable incipient fire source. Some systems formerly dependent for operation on electric current are now completely pneumatic. Automatically operated fixed systems for dry chemical application are now Underwriter listed. Research is going on in halogenated extinguishing agents, and on methods of handling fires in powdered and molten metals. There have been numerous revisions in fire protection standards.

Mr. Hognander . . .

Today, most plants regard floor cleaning machines as cost-saving, semiproductive devices. They work in the busiest aisles as an integral part of plant traffic. By keeping aisles free of bumpy, greasy soilage—as well as loose, scattered foreign material—floor machines become essential to safe, rapid movement of materials and personnel.

New developments: Industrial sweepers are available with UL-approved LP-gas fuel systems. There is also a fast-growing interest in battery-powered machines. Some of the latest machines use hydraulic power to raise and lower rotating cleaning cylinders from the floor.

More emphasis is being given to styling and bright colors—first, as a general trend in industrial machine design; second, to promote safety; third, to stress the new status of mechanized maintenance as a valuable productive function. Productive capacity has not been neglected. Some new units have four or five times the floor cleaning capacity of earlier models.

Mr. Davidson . . .

Central, steam-plant heating systems, in favor 20 years ago, cannot compete in efficiency with the modern industrial space heater, especially in areas where gas is available for heating. The fuel-to-air efficiency of the modern, forced-warm-air method tops that of the central station's "wet" system by about 20 per cent. A comparison of maintenance and operating personnel costs favors the direct-fired space heaters by another 25 to 50 per cent, depending on local regulations and type of fuel available.

Many industrial plant managers, faced with an expensive boiler plant overhaul, have been able to reduce costs substantially with the help of independent surveys conducted by industrial architects and consulting heating engineers.

Such surveys frequently show that the combination of direct-fired space heaters, gas-fired ovens and package steam generators eliminates the need of a boiler plant.

Mr. Pring . . .

Continued progress has been made in the use of cloth filtration to clean gases from electric, steel melting furnaces. In several instances, the user is bagging collected iron oxide from filter hoppers and charging a portion back into the furnace for carbon control.

Other applications of ultrafiltration for high efficiency cleaning of atmospheric air in steel plants have been made. Providing for ventilation of electric motors, transformers and control rooms, none has required any maintenance during operations to date (up to one year of continuous service).

Considerable progress has been made in the development of new fabric constructions and finishing processes for glass-fiber filter fabrics. Additional operating time has been obtained with glass-fiber filter bags, partly as a result of studies of the most effective bag cleaning procedures.

Mr. Ryan . . .

Accident frequency and severity rates have decreased steadily in the steel industry. The credit belongs to the carefully organized, top-management-supported safety programs. Today, protective clothing and equipment are as much a part of a worker's job as his tools.

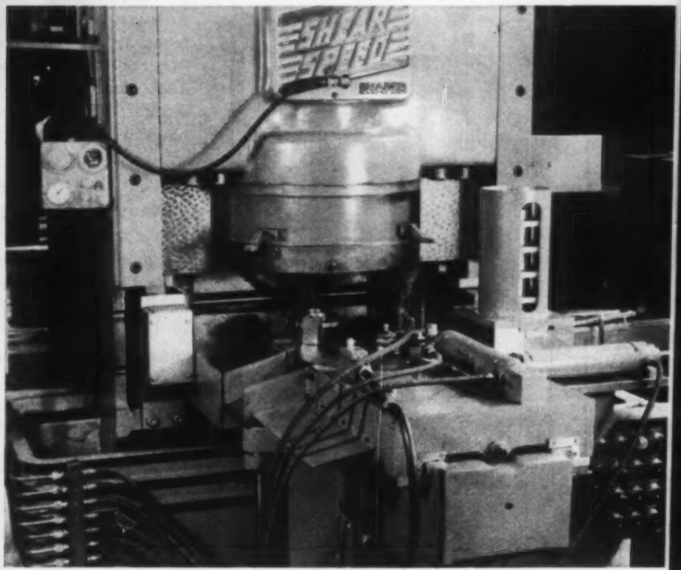
The advent of more and more auto-

This Month's

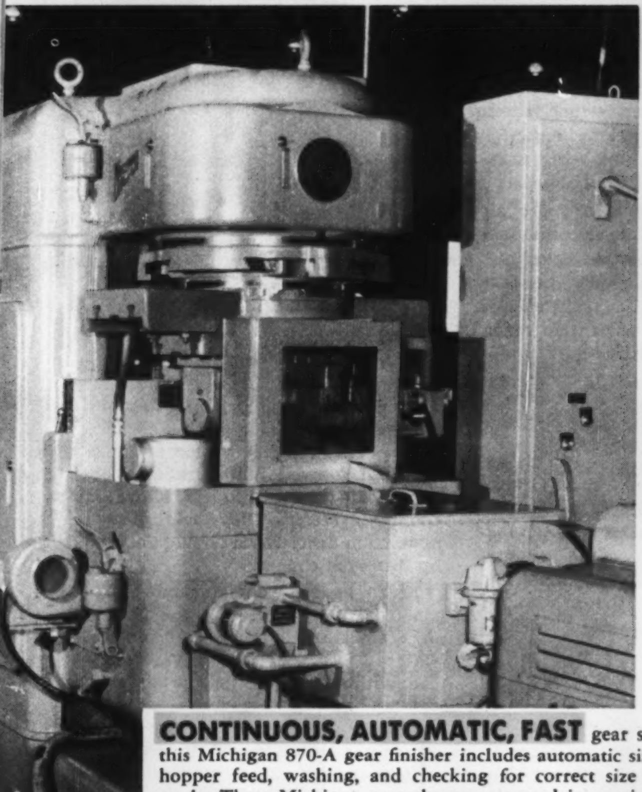
GEAR PIX

MICHIGAN
TOOL COMPANY

NEW LARGER ROTO-FLO spline roller, Model 1551, is capable of cold rolling toothed parts with diameters up to 2 inches. Complete information on this fastest method of forming splines and similar toothed parts is given in Bulletin RF-55.



NEW AUTOMATIC LOADING for Shear-Speed gear shapers, plus automatic size control, offers completely automatic operation on all 1800 series models. Can be specified on new machines or added to Shear-Speeds now in the field.



CONTINUOUS, AUTOMATIC, FAST gear shaving on this Michigan 870-A gear finisher includes automatic size control, hopper feed, washing, and checking for correct size and helix angle. These Michigan gear shavers are used in continuous gear production lines—or in unitized groupings.

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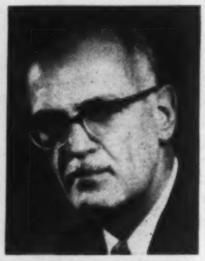
Southbridge, Mass.

E. A. CARSEY
Asst. Chief Engineer, Kirk & Blum
Mfg. Co., Cincinnati



E. P. PARTRIDGE
Director, Hall Laboratories
Inc., Pittsburgh

matic equipment should aid the steady improvement in this safety record. Automation moves many workers to less hazardous areas of mills and factories. A recent development permits a crane operator to open or close furnace doors, soaking pit covers and the like, merely by pushing a button in his cab. The device uses a system similar to an FM radio.

The spread of instrumentation into the safety field means better protection of both men and equipment. For example, the hazards accompanying the increasing use of blast furnace gas around coke ovens and soaking pits is being controlled by instruments which warn visibly and audibly when concentrations of carbon monxide or combustible gases endanger personnel or the plant itself.

Mr. Ytterberg . . .

Installations of the absorption-process-type of floor increased during 1955. Warehouses and storage areas where heavy steel skids are continually dragged across the floor, assembly areas where constant traffic of wheeled equipment is encountered and many other kinds of plants, are relying on heavy-duty floors to keep maintenance bills to a minimum. Floor dusting, which often plagues the production engineer where delicate parts are being manufactured, can be eliminated.

Many of the absorption floors already in service for 30 years are still in good shape. Amortized over the expected life of the plant, the cost of such a floor and its maintenance is invariably lower than that of a conventional concrete floor.

Mr. Gallaway . . .

In its search for lower production costs, industry has found that quality-designed and engineered personal safety equipment can be an important factor. We are in the process of introducing our new lines of spectacle-type, metal and plastic safety glasses, featuring what we call "ultrascopic vision."

In developing these glasses, we studied every component to see what advances could be made in lens strength and contours, side shield construction, adjustability of end pieces, eyewire design, temple variety and ease of replacement, bridge structure and other details.

In development of eye protectors, respirators, safety gloves and clothing and other personal protective equipment, we see industry placing more and more emphasis on quality.

Mr. Carsey . . .

Industrial programs, already scheduled and keyed to an accelerated rate, should continue throughout the ensuing year. Indications point to the necessity of further technical development in plant service and maintenance facilities.

The "Dust and Fume Control Industry" is meeting the challenge by advanced research, engineering and specialized study of application problems.

To be available as system components: Improved design of high-efficiency, centrifugal collectors, water wash units, fabric self-cleaning envelope and tubular bag filters and electronic air cleaning equipment.

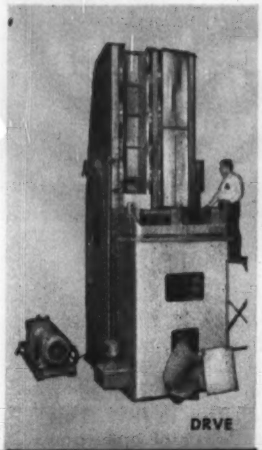
Fan manufacturers promise increased mechanical efficiency, particularly with their new air foil blade. System fittings, elbows, hoods and general layout tend toward laminar or streamlined flow design. Emphasis is being placed on maintenance requirements.

Mr. Partridge . . .

Water is industry's universal raw material. Even when 1 lb of uranium takes the place of more than 1500 tons of coal, water probably will still be used to convert heat energy into mechanical energy.

New chemical tools for better conditioning of water are constantly appearing. Organic polyelectrolytes help iron as well as aluminum flocculating agents to remove color and turbidity. Improved inhibitors cut corrosion of copper and its alloys in cooling systems. They help protect steel from accelerated damage caused by dissolved copper.

Fitting available water most economically to each job is the universal problem. Good management of water will dictate its increasing reuse within a plant and progressive control of contamination—not so much by treatment at the point where the water leaves the plant, as by intelligent engineering to minimize and segregate contamination at each point of origin within the plant.


DRVE

what **BROACHING NEWS**
created the *greatest interest*
in Chicago, at the **MACHINE TOOL SHOW**
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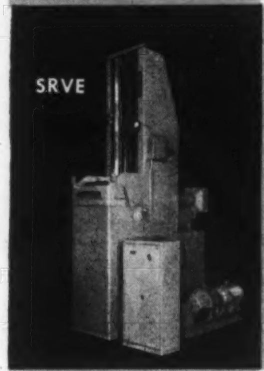
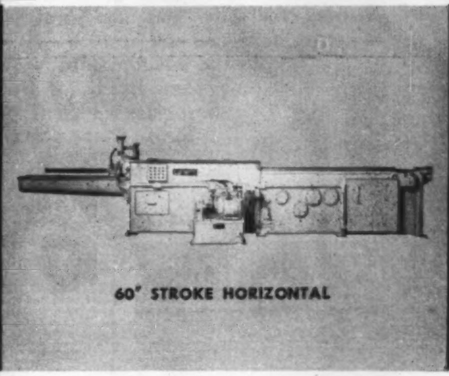
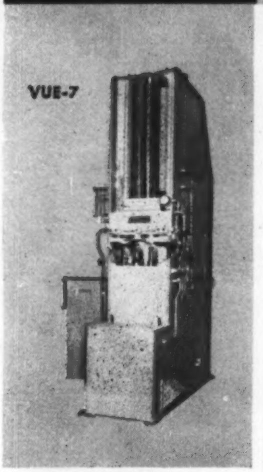
it was the **5 electro-motive drive**
LAPOINTE BROACHING MACHINES!


SRVE


60" STROKE HORIZONTAL

SRHE


VUE-7

The 3 vertical machines and the 2 horizontal machines developed by LAPOINTE with electro-motive drive embody the world's greatest advances in the history of broaching. These machines, in fact, can represent *the most productive floor space in your plant!*

Just why is everyone — especially automotive — turning to the *electro-motive drive* for broaching?

- **Amazing increases in production**
  Broaching speeds up to 300 feet-per-minute (and more) have scrapped all previous concepts of production output!
- **Elimination of chatter**
  Smooth, powerful drive through a mechanical bull gear rack eliminates all chatter and substantially improves quality of work.
- **Permits carbide tooling**
  The high speeds and smooth operation make carbide tooling completely practical.
- **Prolonged tool life**
  Increases of 400% to 500% in tool life, between grinds, reduce downtime and show real dollar savings in tools.

Send for descriptive literature on all 5 LAPOINTE ELECTRO-MOTIVE DRIVE Broaching Machines.

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THE WORLD'S OLDEST AND LARGEST MANUFACTURERS OF BROACHING MACHINES AND BROACHES

Two-Plane Straightener

gives 2-machine performance in one operation

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NATIONAL STEEL CORPORATION

Straightening Spring and N-A-X Tensile Steels at Great Lakes Plant, Ecorse, Mich.

The K&R No. 2B-15 Roll Comb. Vert. and Hor. Straightening Roll, Type B, shown in use at the Great Lakes Steel Corporation, Detroit, Michigan, Division of National Steel Corporation, has continued to give satisfactory service since its installation in 1936. This Two-Plane straightener gives the flexibility of operation needed for edge and flat straightening of rectangles, squares, hexagons and other shapes. Flexibility that gives you the advantage of two-machine operation in one pass. *Illustrated are the modern K&R 2B Straightening Rolls, both Two Plane and Single Plane Types.*

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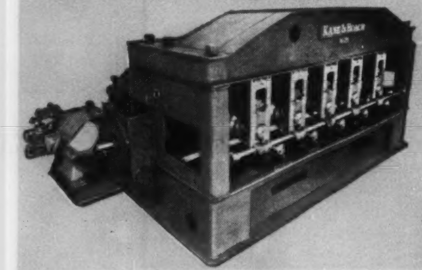
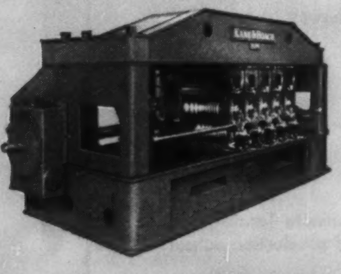
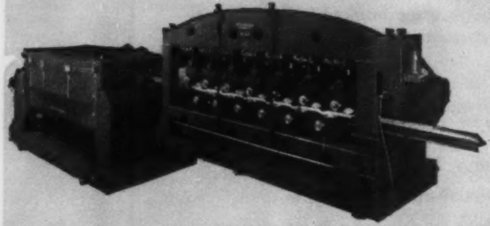




2B-10 Roll Hor. Shaft Straightening Roll, Type B, shown at maximum longitudinal centers, above, and minimum longitudinal centers, below.



2B-24 Roll Comb. Hor. Straightening Roll, Type B.

2B-16 Roll Comb. Hor. and Vert. Straightening Roll, Type B.

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1956

Calendar of Meetings

Jan. 3-6, Institute of Scrap Iron & Steel Inc.: Annual meeting and exhibit, Sherman hotel, Chicago. Institute's address: 1729 H St. N.W., Washington 6, D. C. Executive vice president: Edwin C. Barringer.

Jan. 9-13, Society of Automotive Engineers Inc.: Annual meeting, Sheraton-Cadillac hotel and Hotel Statler, Detroit. Society's address: 29 W. 39th St., New York 18, N. Y. Secretary: John A. C. Warner.

Jan. 11-12, Industrial Fasteners Institute: Winter meeting, Royal York hotel, Toronto, Ont. Institute's address: 1517 Terminal Tower, Cleveland 13, O. Secretary: R. B. Belford.

Jan. 11-13, Aluminum Extruders Council: Annual meeting, Saxony hotel, Miami Beach, Fla. Council's address: 209 Washington St., Boston, Mass. Executive secretary: Phillip Lemelman.

Jan. 11-14, American Road Builders' Association: Annual convention and exhibit, Municipal Auditorium, Miami Beach, Fla. Association's address: World Center Bldg., Washington 6, D. C. Executive vice president and secretary: Eugene Reybold.

Jan. 18-19, Caster & Floor Truck Manufacturers Association: Annual meeting, New Weston hotel, New York. Association's address: 27 E. Monroe St., Chicago 3, Ill. Secretary: Harry P. Dolan.

Jan. 18-19, Steel Shipping Containers Institute Inc.: Winter meeting, Hampshire House, New York. Institute's address: 600 Fifth Ave., New York 20, N. Y. Secretary: L. B. Miller.

Jan. 19-20, Steel Plate Fabricators Association: Annual meeting, Palmer House, Chicago. Association's address: 79 W. Monroe St., Chicago 3, Ill. Secretary: J. Dwight Evans.

Jan. 20, Malleable Founders' Society: Semiannual meeting, Hotel Cleveland, Cleveland. Society's address: 1800 Union Commerce Bldg., Cleveland 15, O. Secretary: Lowell D. Ryan.

Jan. 23-24, Industrial Heating Equipment Association: Annual meeting, LaSalle hotel, Chicago. Association's address: Associations Bldg., Washington 6, D. C. Executive vice president: Carl L. Ipsen.

Jan. 23-25, Truck-Trailer Manufacturers Association Inc.: Annual meeting, Edgewater Gulf hotel, Edgewater Park, Miss. Association's address: 710 Albee Bldg., Washington 5, D. C. Managing director: John Hulse.

Jan. 23-26, Plant Maintenance & Engineering Show: Convention Hall, Philadelphia. Information: Clapp & Poliak Inc., 341 Madison Ave., New York 17, N. Y.

Jan. 24, Cutting Tool Manufacturers Association: Annual meeting, Detroit Yacht Club, Detroit. Association's address: 416 Penobscot Bldg., Detroit 26, Mich. Executive secretary: Martin J. Ewald.

Jan. 24-27, American Management Association: General management conference, Fairmont hotel, San Francisco. Association's address: 330 W. 42nd St., New York 36, N. Y. Vice president-secretary: James O. Rice.

Jan. 26-27, Blast Furnace & Coke Association of the Chicago District: Winter meeting, Del Prado hotel, Chicago. Information: C. W. Bruce, chief engineer, Republic Steel Corp., 11600 S. Burley Ave., Chicago 17, Ill.

Jan. 28-Feb. 4, Industrial Diamond Association of America Inc.: Annual meeting, Hollywood Beach hotel, Hollywood Beach, Fla. Association's address: Box 175, Pompton Plains, N. J. Executive manager: Athos D. Leveridge.

Jan. 29-Feb. 2, Associated Equipment Distributors: Annual meeting and exhibit, Conrad Hilton hotel, Chicago. Association's address: 30 E. Cedar St., Chicago, Ill. Executive secretary: P. D. Hermann.

Jan. 30-Feb. 3, American Institute of Electrical Engineers: Winter general meeting, Hotel Statler, New York. Institute's address: 33 W. 39th St., New York 18, N. Y. Secretary: N. S. Hibshman.

Feb. 1-2, Midwest Welding Conference: Armour Research Foundation, Illinois Institute of Technology, Chicago. Information: Harry Schwartzbart, Armour Research Foundation, 35 W. 33rd St., Chicago 16, Ill.

Feb. 6-8, American Management Association: Marketing conference, Hotel Statler, New York. Association's address: 330 W. 42nd St., New York 36, N. Y. Vice president-secretary: James O. Rice.

Feb. 9-10, Steel Kitchen Cabinet Manufacturers Association. Spring meeting, Waldorf-Astoria, New York. Association's address: 1008 Engineers Bldg., Cleveland 14, O. Secretary: Arthur J. Tuscany Jr.

Feb. 13-17, American Society of Civil Engineers: Winter meeting, Baker hotel, Dallas, Tex. Society's address: 33 W. 39th St., New York, N. Y. Secretary: William N. Wisely.

Feb. 15-17, American Management Association: Personnel conference, Palmer House, Chicago. Association's address: 330 W. 42nd St., New York 36, N. Y. Vice president-secretary: James O. Rice.

Feb. 16-17, Drop Forging Association: Winter industry meeting, Park Sheraton hotel, New York. Association's address: 419 S. Walnut St., Lansing, Mich. Executive vice president: Edgar L. Harden.

Feb. 16-17, Eastern States Blast Furnace & Coke Oven Association: Winter meeting, William Penn hotel, Pittsburgh. Information: B. W. Norton, Shenango Furnace Co., Sharpsville, Pa.

Feb. 19-23, American Institute of Mining & Metallurgical Engineers: Annual meeting, Hotels Statler and New Yorker, New York. Institute's address: 29 W. 39th St., New York 18, N. Y. Secretary: E. O. Kirkendall.

Feb. 26-29, American Institute of Chemical Engineers: Winter meeting, Hotel Statler, Los Angeles. Institute's address: 120 E. 41st St., New York 17, N. Y. Secretary: F. J. Van Antwerpen.

Feb. 27-Mar. 2, American Society for Testing Materials: Committee week, Hotel Statler, Buffalo. Society's address: 1916 Race St., Philadelphia 3, Pa. Executive secretary: Robert J. Painter.

Mar. 2, National Metal Trades Association: Mid-Atlantic assembly, Hotel Commodore, New York. Association's address: 122 S. Michigan Ave., Chicago 3, Ill. Secretary: Charles L. Blatchford.

Mar. 6-8, Society of Automotive Engineers Inc.: National passenger car, body and materials meeting, Hotel Statler, Detroit. Society's address: 29 W. 39th St., New York 18, N. Y. Secretary: John A. C. Warner.

Mar. 11-14, National Association of Waste Material Dealers Inc.: Annual meeting, Waldorf-Astoria, New York. Association's address: 271 Madison Ave., New York 16, N. Y. Managing director: Clinton M. White.

Mar. 12-14, International Acetylene Association: Annual meeting, Hotel Statler, Los Angeles. Association's address: 30 E. 42nd St., New York 17, N. Y. Secretary: H. F. Reinhard.

Mar. 12-15, National Electrical Manufacturers Association: Mid-winter meeting, Edgewater Beach hotel, Chicago. Association's address: 155 E. 44th St., New York 17, N. Y. Managing director: Joseph F. Miller.

Mar. 12-16, National Association of Corrosion Engineers: Annual meeting and exhibit, Hotel Statler, New York. Association's address: 1061 M & M Bldg., Houston 2, Tex. Executive secretary: A. B. Campbell.

Mar. 13-15, Radio-Electronics-Television Manufacturers Association: Spring meeting, Biltmore hotel, New York. Association's address: 777 14th St. N.W., Washington 5, D. C. Secretary: James D. Secrest.

Mar. 14-16, American Society of Mechanical Engineers: Aviation conference, Hotel Statler, Los Angeles. Society's address: 29 W. 39th St., New York 18, N. Y. Secretary: C. E. Davies.

Mar. 14-16, Pressed Metal Institute: Annual Spring technical meeting, Carter hotel, Cleveland. Institute's address: 3673 Lee Rd., Shaker Heights, O. Managing director: H. A. Daschner.

Mar. 18-20, American Machine Tool Distributors Association: Spring meeting, Hotel Statler, Detroit. Association's address: 1900 Arch St., Philadelphia 3, Pa. Executive secretary: Thomas A. Fernley Jr.

Mar. 18-20, Steel Founders' Society of America: Annual meeting, Drake hotel, Chicago. Society's address: 606 Terminal Tower, Cleveland 13, O. Executive vice president: F. Kermit Donaldson.

Mar. 19-21, American Society of Mechanical Engineers: Spring meeting, Multnomah hotel, Portland, Ore. Society's address: 29 W. 39th St., New York 18, N. Y. Secretary: C. E. Davies.

Mar. 19-21, Society of Automotive Engineers Inc.: National production meeting and forum, Hotel Statler, Cleveland. Society's address: 29 W. 39th St., New York 18, N. Y. Secretary: John A. C. Warner.

Mar. 19-23, American Society of Tool Engineers: Industrial exposition and annual convention, International Amphitheatre and Contrad Hilton hotel, Chicago. Society's address: 10700 Puritan Ave., Detroit, Mich. Executive secretary: Harry E. Conrad.

Mar. 22-23, American Hot Dip Galvanizers Association: Annual meeting, Drake hotel, Chicago. Association's address: 1806 First

National Bank Bldg., Pittsburgh 22, Pa. Secretary: Stuart J. Swensson.

Apr. 1-5, American Society of Mechanical Engineers: Oil and gas power conference, Jung hotel, New Orleans. Society's address: 29 W. 39th St., New York 18, N. Y. Secretary: C. E. Davies.

Apr. 3, Material Handling Institute: Spring meeting, Edgewater Beach hotel, Chicago. Institute's address: One Gateway Center, Pittsburgh 22, Pa. Managing director: R. Kennedy Hanson.

Apr. 3-4, Industrial Truck Association: Spring meeting, Edgewater Beach hotel, Chicago. Association's address: 900 F St. N.W., Washington, D. C. Secretary: William Van C. Brandt.

Apr. 4-6, American Institute of Steel Construction Inc.: Spring meeting and national engineering conference, Lehigh University, Bethlehem, Pa. Institute's address: 101 Park Ave., New York 17, N. Y. Secretary: M. Harvey Smedley.

Apr. 4-6, American Society of Lubrication Engineers: Annual meeting and exhibit, William Penn hotel, Pittsburgh. Society's address: 84 E. Randolph St., Chicago 1, Ill. Administrative secretary: William P. Youngclaus Jr.

Apr. 4-6, Rail Steel Bar Association: Annual meeting, Boca Raton hotel and club, Boca Raton, Fla. Association's address: 38 S. Dearborn St., Chicago 3, Ill. Secretary: W. H. Jacobs.

Apr. 4-7, National Screw Machine Products Association: Annual meeting, Schroeder hotel, Milwaukee. Association's address: 2860 E. 130th St., Cleveland 20, O. Executive vice president: Orrin B. Werntz.

Apr. 8, Packaging Machinery Manufacturers Institute: Spring meeting, Dennis hotel, Atlantic City, N. J. Institute's address: 342 Madison Ave., New York 17, N. Y. Executive director: R. L. Sears.

Apr. 8-12, Scientific Apparatus Makers Association: Annual meeting, Belleview-Biltmore, Belleair, Fla. Association's address: 20 N. Wacker Dr., Chicago 6, Ill. Executive vice president: Kenneth Andersen.

Apr. 9-11, American Institute of Mining & Metallurgical Engineers: National Open-Hearth conference, Netherland Plaza hotel, Cincinnati. Institute's address: 29 W. 39th St., New York 18, N. Y. Secretary: E. O. Kirkendall.

Apr. 9-12, American Management Association: Packaging conference, Convention Hall, Atlantic City, N. J. Association's address: 330 W. 42nd St., New York 36, N. Y. Vice president-secretary: James O. Rice.

Apr. 9-12, Society of Automotive Engineers Inc.: National aeronautic meeting, aeronautic production forum and aircraft engineering display, Hotel Statler, New York. Society's address: 29 W. 39th St., New York 18, N. Y. Secretary: John A. C. Warner.

Apr. 10-11, American Society of Mechanical Engineers: Machine design conference, Bancroft hotel, Worcester, Mass. Society's address: 29 W. 39th St., New York 18, N. Y. Secretary: C. E. Davies.

Apr. 10-12, Metal Powder Association: Annual meeting and show, Hotel Cleveland, Cleveland. Association's address: 420 Lexington Ave., New York 17, N. Y. Secretary: Robert L. Ziegfeld.

Apr. 15-19, American Hardware Manufacturers' Association: Spring convention, Roosevelt hotel, New Orleans. Association's address: 342 Madison Ave., New York 17, N. Y. Secretary-treasurer: Arthur Faubel.

Apr. 16-17, American Society of Mechanical Engineers: Gas turbine power conference, Hotel Statler, Washington. Society's address: 29 W. 39th St., New York 18, N. Y. Secretary: C. E. Davies.

Apr. 18-19, Bituminous Coal Research Inc.: Annual meeting, Deshler Hilton hotel, Columbus, O. Association's address: 804 Southern Bldg., Washington, D. C. Secretary: C. A. Reed.

Apr. 19-21, Gas Appliance Manufacturers Association: Annual meeting, Greenbrier, White Sulphur Springs, W. Va. Association's address: 60 E. 42nd St., New York 17, N. Y. Secretary: Harold Massey.

Apr. 22-26, American Ceramic Society: Annual meeting, Hotel Statler, New York. Society's address: 4055 N. High St., Columbus 14, O. Secretary: Charles S. Pearce.

Apr. 23-25, American Zinc Institute and Lead Industries Association: Combined annual meeting, Hotel Statler, St. Louis. Information: Robert L. Ziegfeld, 420 Lexington Ave., New York 17, N. Y.

Apr. 29-May 3, Electrochemical Society: Spring meeting, Mark-Hopkins hotel, San Francisco. Society's address: 216 W. 102nd St., New York 25, N. Y. Secretary: R. M. Burns.

Apr. 30-May 2, Association of Iron & Steel Engineers: Spring meeting, Lord Baltimore hotel, Baltimore. Association's address: 1010 Empire Bldg., Pittsburgh 22, Pa. Managing director: T. J. Ess.

Apr. 30-May 2, Metal Treating Institute: Spring meeting, Roosevelt hotel, New Orleans. Institute's address: 271 North Ave., New Rochelle, N. Y. Secretary: C. E. Herington.

May 2-4, Industrial Fasteners Institute: Annual meeting, Homestead, Hot Springs, Va. Institute's address: 1517 Terminal Tower, Cleveland 13, O. Secretary: R. B. Belford.

May 2-4, Investment Casting Institute: Spring meeting and exhibit, Warwick hotel, New York. Institute's address: 27 E. Monroe St., Chicago 3, Ill. Executive secretary: Harry P. Dolan.

May 3-9, American Foundrymen's Society: Biennial convention and show, Convention Hall, Atlantic City, N. J. Society's address: Golf & Wolf Rds., Des Plaines, Ill. Secretary: William W. Maloney.

May 6-9, American Institute of Chemical Engineers: Spring meeting, Roosevelt hotel, New Orleans. Institute's address: 120 E. 41st St., New York 17, N. Y. Secretary: F. J. Van Antwerpen.

May 6-9, American Steel Warehouse Association: Annual meeting, Fairmont hotel, San Francisco. Association's address: 442 Terminal Tower, Cleveland, O. Executive secretary: Robert G. Welch.

May 6-9, Liquefied Petroleum Gas Association Inc.: Annual meeting and exhibit, Conrad Hilton hotel, Chicago. Association's address: 11 S. LaSalle St., Chicago 1, Ill. Secretary: Arthur C. Kreutzer.

May 7-9, American Mining Congress: Coal convention, Netherland Plaza, Cincinnati. Congress' address: 1102 Ring Bldg., Washington 6, D. C. Executive vice president and secretary: Julian D. Conover.

May 7-11, American Welding Society: National spring technical meeting and welding show, Hotel Statler and Memorial Auditorium, Buffalo. Society's address: 33 W. 39th St., New York 18, N. Y. Secretary: J. G. Magrath.

May 8-11, American Society of Mechanical Engineers: Metals engineering-AWS conference, Hotel Statler, Buffalo, N. Y. Society's address: 29 W. 39th St., New York 18, N.Y. Secretary: C. E. Davies.

May 9-11, American Management Association: Insurance conference, Hotel Roosevelt, New York. Association's address: 330 W. 42nd St., New York 36, N. Y. Vice president-secretary: James O. Rice.

May 9-11, National Association of Sheet Metal Distributors: Spring meeting, Roosevelt hotel, Pittsburgh. Association's address: 1900 Arch St., Philadelphia 3, Pa. Executive secretary: Thomas A. Fernley Jr.

May 10-11, Refractories Institute: Annual meeting, Grand hotel, Point Clear, Ala. Institute's address: 1801 First National Bank Bldg., Pittsburgh 22, Pa. Executive secretary: Avery C. Newton.

May 14-16, National Industrial Service Association: Annual meeting and exhibit, Bellevue-Stratford hotel, Philadelphia. Association's address: 818 Olive St., St. Louis 1, Mo. Executive secretary: Fred Wipperman.

May 14-17, Design Engineering Show: Convention Hall, Philadelphia. Information: Clapp & Poliak Inc., 341 Madison Ave., New York 17, N. Y.

May 16-18, Anti-Friction Bearing Manufacturers Association Inc.: Annual meeting, Princeton Inn, Princeton N. J. Association's address: 60 E. 42nd St., New York 17, N. Y. Secretary: H. O. Smith.

May 16-18, Society for Experimental Stress Analysis: Spring meeting, William Penn hotel, Pittsburgh. Society's address: P. O. Box 168, Cambridge 39, Mass. Secretary: W. M. Murray.

May 17-18, National Industrial Conference Board Inc.: Annual meeting and general session for all associates, Waldorf-Astoria, New York. Board's address: 460 Park Ave., New York 22, N. Y. Secretary: Herbert S. Briggs.

May 20-23, Industrial Heating Equipment Association: Spring meeting, Homestead, Hot Springs, Va. Association's address: Associations Bldg., Washington, D. C. Executive vice president: Carl L. Ipsen.

May 20-23 National Association of Purchasing Agents: Annual convention and show, Hotel Cleveland, Cleveland. Association's address: 11 Park Place, New York 7, N. Y. Executive secretary-treasurer: G. A. Renard.

May 20-23, National Industrial Advertisers Association: Annual meeting, Palmer House, Chicago. Association's address: 271 Madison Ave., New York 16, N. Y. President: John C. Freeman.

May 21-23, Triple Industrial Supply Convention: Traymore hotel and Chalfonte-Haddon Hall, Atlantic City, N. J. Information: W. B. Thomas, Hunter-Thomas Associates, 2130 Keith Bldg., Cleveland 15, O.

May 23-24, American Iron & Steel Institute: Annual meeting, Waldorf-Astoria, New York. Institute's address: 350 Fifth Ave., New York 1, N. Y. Secretary: George S. Rose.

May 23-25, American Management Association: General management conference, Hotel Roosevelt, New York. Association's address: 330 W. 42nd St., New York 36, N. Y. Vice president-secretary: James O. Rice.

May 28-31, National Fluid Power Association: Annual meeting, Greenbrier, White Sulphur Springs, W. Va. Association's address: 1618 Orrington Ave., Evanston, Ill. Secretary: Barrett Rogers.

May 28-June 2, Concrete Reinforcing Steel Institute: Annual meeting, Greenbrier, White Sulphur Springs, W. Va. Institute's address: 38 S. Dearborn St., Chicago 3, Ill. Managing director: H. C. Delzell.

June 1-3, Steel Kitchen Cabinet Manufacturers Association: Annual meeting, Greenbrier, White Sulphur Springs, W. Va. Association's address: 1008 Engineers Bldg., Cleveland 14, O. Secretary: Arthur J. Tuscany Jr.

June 3-6 Automotive Engineer Rebuilders Association: Annual meeting, Sherman hotel, Chicago. Association's address: 419 N. Capitol Ave., Indianapolis 4, Ind. Executive vice president: R. G. Patterson.

June 3-6, American Gear Manufacturers Association: Annual meeting, Homestead, Hot Springs, Va. Association's address: One Thomas Circle, Washington 5, D. C. Executive secretary: John C. Sears.

June 3-8, Society of Automotive Engineers Inc.: Summer meeting, Chalfonte-Haddon Hall, Atlantic City, N. J. Society's address: 29 W. 39th St., New York 18, N. Y. Secretary: John A. C. Warner.

June 4-7, National District Heating Association: Annual meeting, Inn and Lodge, Williamsburg, Va. Association's address: 827 N. Euclid Ave., Pittsburgh 6, Pa. Secretary-treasurer: John F. Collins Jr.

June 5-8, Material Handling Institute Inc.: Material handling exposition, Public Auditorium, Cleveland. Institute's address: One Gateway Center, Pittsburgh 22, Pa. Managing director: R. Kennedy Hanson.

June 6-8, American Society for Quality Control: Annual meeting, Mt. Royal hotel, Montreal, Que. Society's address: 50 Church St., New York 7, N. Y. Secretary: C. E. Fisher.

June 7-8, Machinery & Allied Products Institute: Annual meeting, Hotel Statler, Washington. Institute's address: 1200 18th St. N. W., Washington 6, D. C. Secretary: Charles I. Derr.

June 7-10, National Metal Trades Association: Western plant management conference, Dell View hotel, Lake Delton, Wis. Association's address: 122 S. Michigan Ave., Chicago 3, Ill. Secretary: Charles L. Blatchford.

June 11-12, Malleable Founders' Society: Annual meeting, Homestead, Hot Springs, Va. Society's address: 1800 Union Commerce Bldg., Cleveland 14, O. Secretary: Lowell D. Ryan.

June 11-15, Society of the Plastics Industry Inc.: National plastics exposition, Coliseum, New York. Society's address: 67 W. 44th St., New York 36, N. Y. Executive vice president: William T. Cruse.

June 12-14, Radio-Electronics-Television Manufacturers Association: Annual meeting, Edgewater Beach hotel, Chicago. Association's adaddress: 777 14th St. N. W., Washington 5,

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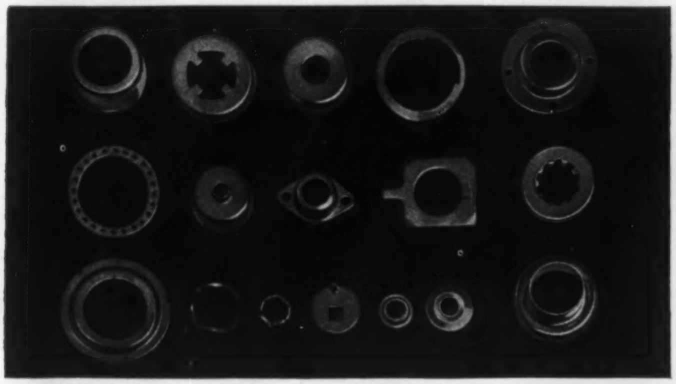

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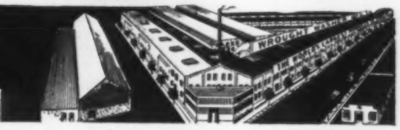

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D. C. Secretary: James D. Secrest.

June 17-21, American Electroplaters Society: Annual meeting, Hotel Statler, Washington. Society's address: 445 Broad St., Newark, N. J. Secretary: P. P. Kovatis.

June 17-21, American Society of Mechanical Engineers: Semiannual meeting, Hotel Statler, Cleveland. Society's address: 29 W. 39th St., New York 18, N. Y. Secretary: C. E. Davies.

June 17-22, American Society for Testing Materials: Annual meeting and apparatus exhibit, Chalfonte-Haddon Hall, Atlantic City, N. J. Society's address: 1916 Race St., Philadelphia 3, Pa. Executive secretary: Robert J. Painter.

June 19-22, Aviation Distributors & Manufacturers Association: Summer meeting, Grove Park Inn, Asheville, N. C. Association's address: 1900 Arch St., Philadelphia 3, Pa. Executive secretary: H. Donald Richards.

June 24-26, Alloy Casting Institute: Annual meeting, The Homestead, Hot Springs, Va. Institute's address: 32 Third Ave., Mineola, N. Y. Executive vice president: E. A. Schoefer.

June 24-27, Drop Forging Association: Annual meeting, The Homestead, Hot Springs, Va. Association's address: 419 S. Walnut St., Lansing, Mich. Executive vice president: Edgar L. Harden.

June 25-29, American Institute of Electrical Engineers: Combined Summer and Pacific general meeting, Fairmont hotel, San Francisco. Institute's address: 33 W. 39th St., New York 18, N. Y. Secretary: N. S. Hibshman.

June 28-July 1, American Coal Sales Association: The Greenbrier, White Sulphur Springs, W. Va. Association's address: 1625 Eye St. N.W., Washington 6, D. C. Executive vice president: W. W. Bayfield.

July 19-20, Truck-Trailer Manufacturers Association Inc.: Summer meeting, Edgewater Beach hotel, Chicago. Association's address: 710 Albee Bldg., Washington 5, D. C. Managing director: John B. Hulse.

Aug. 6-8, Society of Automotive Engineers Inc.: National west coast meeting, Mark-Hopkins hotel, San Francisco. Society's address: 29 W. 39th St., New York 18, N. Y. Secretary: John A. C. Warner.

Sept. 7-9, Metal Powder Association: Fall meeting, The Homestead, Hot Springs, Va. Association's address: 420 Lexington Ave., New York 17, N. Y. Secretary: Robert L. Ziegfeld.

Sept. 9-12, American Institute of Chemical Engineers: Fall meeting, William Penn hotel, Pittsburgh. Institute's address: 120 E. 41st St., New York 17, N. Y. Secretary: F. J. Van Antwerpen.

Sept. 9-12, National Metal Trades Association: Eastern plant management conference, Essex-Sussex hotel, Spring Lake, N. J. Association's address: 122 S. Michigan Ave., Chicago 3, Ill. Secretary: Charles L. Blatchford.

Sept. 10-13, Society of Automotive Engineers Inc.: National tractor meeting and production forum, Hotel Schroeder, Milwaukee. Society's address: 29 W. 39th St., New York 18, N. Y. Secretary: John A. C. Warner.

Sept. 11-13, American Die Casting Institute: Annual meeting, Edgewater Beach hotel, Chicago. Institute's address: 366 Madison Ave., New York 17, N. Y. Secretary: David Laine.

Sept. 11-14, Packaging Machinery Manufacturers Institute: Packaging machinery and materials exposition, Public Auditorium, Cleveland. Information: Hanson & Shea Inc.: One Gateway Center, Pittsburgh 22, Pa.

Sept. 12-14, Porcelain Enamel Institute: Annual meeting, Broadmoor hotel, Colorado Springs, Colo. Institute's address: 1145 19th St. N.W., Washington 6, D. C. Secretary: John C. Oliver.

Sept. 16-20, American Society of Sanitary Engineering: Annual meeting, Morrison hotel, Chicago. Society's address: 4716 Ewing Ave. S., Minneapolis. Secretary: Walter A. Dunn.

Sept. 16-21, American Chemical Society: Annual meeting, Convention Hall, Atlantic City, N. J. Society's address: 1155-16th St. N.W., Washington 6, D. C. Executive secretary: Aden H. Emery.

Sept. 16-22, American Society for Testing Materials: Pacific area national meeting and apparatus exhibit, Hotel Statler, Los Angeles. Society's address: 1916 Race St., Philadelphia 3, Pa. Executive secretary: Robert J. Painter.

Sept. 17-21, Instrument Society of America: Annual instrument-automation conference and exhibit, Coliseum, New York. Society's address: 1319 Allegheny Ave., Pittsburgh 33, Pa. Executive director: William H. Kushnick.

Sept. 20-21, American Hot Dip Galvanizers Association: Semiannual meeting, Greenbrier, White Sulphur Springs, W. Va. Association's address: 1806 First National Bank Bldg., Pittsburgh 22, Pa. Secretary: Stuart J. Swensson.

Sept. 21, Cutting Tool Manufacturers Association: Fall meeting, Lochmoor Club, Detroit. Association's address: 416 Penobscot Bldg., Detroit 26, Mich. Secretary: M. G. Ewald.

Sept. 24-25, Steel Founders' Society of America: Fall meeting, Greenbrier, White Sulphur Springs, W. Va. Society's address: 606 Terminal Tower, Cleveland 13, O. Executive vice president: F. Kermit Donaldson.

Sept. 24-25, Material Handling Institute Fall meeting, Greenbrier, White Sulphur Springs, W. Va. Institute's address: One Gateway Center, Pittsburgh 22, Pa. Managing director: R. Kennedy Hanson.

Sept. 25-28, Association of Iron & Steel Engineers: Annual meeting and exhibit, Public Auditorium, Cleveland. Association's address: 1010 Empire Bldg., Pittsburgh 22, Pa. Managing director: T. J. Ess.

Sept. 27-29, National Association of Foremen: Annual meeting, Jefferson hotel, St. Louis. Association's address: 321 W. First St., Dayton 2, O. Secretary: Jean B. Adams.

Oct. 1-3, National Electronics Conference Inc.: Annual meeting and exhibit, Sherman hotel, Chicago. Conference's address: 84 E. Randolph St., Chicago 1, Ill. Executive secretary: John S. Powers.

Oct. 1-4, American Mining Congress: Metal mining and industrial minerals convention and exposition, Shrine Auditorium and Exposition Hall, Los Angeles. Congress' address: 1102 Ring Bldg., Washington 6, D. C. Executive vice president and secretary: Julian D. Conover.

Oct. 1-5, American Institute of Electrical Enginners: Fall general meeting, Morrison hotel, Chicago. Institute's address: 33 W. 39th St., New York 18, N. Y. Secretary: N. S. Hibshman.

Oct. 2-6, Society of Automotive Engineers Inc.: National aeronautic meeting, aircraft production forum and aircraft engineering display, Hotel Statler, Los Angeles, Calif. Society's address: 29 W. 39th St., New York 18, N. Y. Secretary: John A. C. Warner.

Oct. 4-5, Magnesium Association: Annual meeting, Drake hotel, Chicago. Association's address: 122 E. 42nd St., New York 17, N. Y. Secretary: Jerry Singleton.

Oct. 8-10, American Society of Mechanical Engineers: Lubrication conference, Chalfonte-Haddon Hall, Atlantic City, N. J. Society's address: 29 W. 39th St., New York 18, N. Y. Secretary: C. E. Davies.

Oct. 8-12, National Metal Congress & Exposition: Public Auditorium, Cleveland. Information: American Society for Metals, 7301 Euclid Ave., Cleveland 3, O. Secretary: W. H. Eisenman.

Oct. 8-12, American Society for Metals: Annual meeting, Hotel Statler, Cleveland. Society's address: 7301 Euclid Ave., Cleveland 3, O. Secretary: W. H. Eisenman.

Oct. 8-12, American Welding Society: Fall technical meeting, Hotel Cleveland, Cleveland. Society's address: 33 W. 39th St., New York 18, N. Y. Secretary: J. G. Magrath.

Oct. 10-12, Society of Automotive Engineers Inc.: National transportation meeting, Hotel Statler, New York. Society's address: 29 W. 39th St., New York 18, N. Y. Secretary: John A. C. Warner.

Oct. 11-12, National Foundry Association: Annual meeting, Sheraton-Cadillac hotel, Detroit. Association's address: 53 W. Jackson Blvd., Chicago 4, Ill. Executive secretary: C. T. Sheeham.

Oct. 14-16, American Machine Tool Distributors Association: Annual meeting, Broadmoor hotel, Colorado Springs, Colo. Association's address: 1900 Arch St., Philadelphia 3, Pa. Executive secretary: Thomas A. Fernley Jr.

Oct. 15-16, Rail Steel Bar Association: Fall meeting, Sheraton Mt.. Royal hotel, Montreal, Que. Association's address: 38 S. Dearborn St., Chicago 3, Ill. Secretary: W. H. Jacobs.

Oct. 18-20, Foundry Equipment Manufacturers Association Inc.: Annual meeting, Greenbrier, White Sulphur Springs, W. Va. Association's address: One Thomas Circle, Washington 5, D. C. Secretary: C. R. Heller.

Oct. 20-23, Conveyor Equipment Manufacturers Association: Annual meeting, Greenbrier, White Sulphur Springs, W. Va. Association's address: One Thomas Circle, Washington 5, D. C. Executive vice president: R. C. Sollenberger.

Oct. 24-25, American Society of Mechanical Engineers: Fuels conference, Sheraton-Park hotel, Washington. Society's address: 29 W. 39th St., New York 18, N. Y. Secretary: C. E. Davies.

Oct. 28-31, American Gear Manufacturers Association: Semiannual meeting, Edgewater Beach hotel, Chicago. Association's address: One Thomas Circle, Washington 5, D. C. Executive secretary: John C. Sears.

Oct. 28-31, American Institute of Wholesale Plumbing & Heating Supply Associations Inc.: Annual meeting and business conference program, Sheraton Park hotel, Washington. Institute's address: 402 Albee Bldg., Washington, D. C. Executive secetary: George T. Underwood.

Oct. 28-Nov. 1, American Institute of Steel Construction Inc.: National convention, Greenbrier, White Sulphur Springs, W. Va. Institute's address: 101 Park Ave., New York 17, N. Y. Secretary: M. Harvey Smedley.

Oct. 28-Nov. 1, Electrochemical Society: Fall meeting, Hotel Statler, Cleveland. Society's address: 216 W. 102nd St., New York 25, N. Y. Secretary: H. B. Linford.

Oct. 29-31, Truck Body & Equipment Association Inc.: Annual meeting, Sherman hotel, Chicago. Association's address: 1616 K St. N. W., Washington 6, D. C. Secretary: Arthur H. Nuesse.

Oct. 29-30, Refractories Institute: Fall meeting, The Homestead, Hot Springs, Va. Institute's address: 1801 First National Bank Bldg., Pittsburgh 22, Pa. Executive secretary: Avery C. Newton.

Oct. 29-Nov. 1, Wire Association: Annual meeting, Willian Penn hotel, Pittsburgh. Association's address: 435 Main St., Stamford Conn. Secretary: Richard E. Brown.

Oct. 30-Nov. 1, National Fluid Power Association: Fall meeting, Hotel Cleveland, Cleveland. Association's address: 1618 Orrington Ave., Evanston, Ill. Secretary: Barrett Rogers.

Oct. 30-Nov. 2, Gray Iron Founders Society Inc.: Annual meeting, The Homestead, Hot Springs, Va. Society's address: National City—E. 6th Bldg., Cleveland 14, O. Executive vice president: Donald H. Workman.

Nov. 1-2, Society of Automotive Engineers Inc.: National diesel engine meeting, Drake hotel, Chicago. Society's address: 29 W. 39th St., New York 18, N. Y. Secretary: John A. C. Warner.

Nov. 1-4, National Tool & Die Manufacturers Association: Annual meeting, Hotel Statler, Hartford, Conn. Association's address: 907 Public Square Bldg., Cleveland 13, O. Executive secretary: George S. Eaton.

Nov. 8-9, Society of Automotive Engineers Inc.: National fuels and lubricants meeting, Mayo hotel, Tulsa, Okla. Society's address: 29 W. 39th St., New York 18, N. Y. Secretary: John A. C. Warner.

Nov. 12-16, National Electrical Manufacturers Association: Annual meeting, Traymore hotel, Atlantic City, N. J. Association's address: 155 E. 44th St., New York 17, N. Y. Managing director: Joseph F. Miller.

Nov. 27-30, National Chemical Exposition: Public Auditorium, Cleveland. Information: American Chemical Society, Chicago section, 86 E. Randolph St., Chicago 1, Ill.

Nov. 28-30, National Industrial Conference Board Inc.: Atomic energy conference, Waldorf-Astoria, New York. Board's address: 460 Park Ave., New York 22, N. Y. Secretary: Herbert S. Briggs.

Nov. 25-30, American Society of Mechanical Engineers: Annual meeting, Hotel Statler, New York. Society's address: 29 W. 39th St., New York 18, N. Y. Secretary: C. E. Davies.

Dec. 5-7, National Association of Manufacturers: Annual meeting and exhibit, Waldorf-Astoria, New York. Association's address: 2 E. 48th St., New York 17, N. Y. Secretary: Thomas M. Brennan.

Dec. 9-12, American Institute of Chemical Engineers: Annual meeting, Hotel Statler, Boston. Institute's address: 120 E. 41st St., New York 17, N. Y. Secretary: F. J. Van Antwerpen.

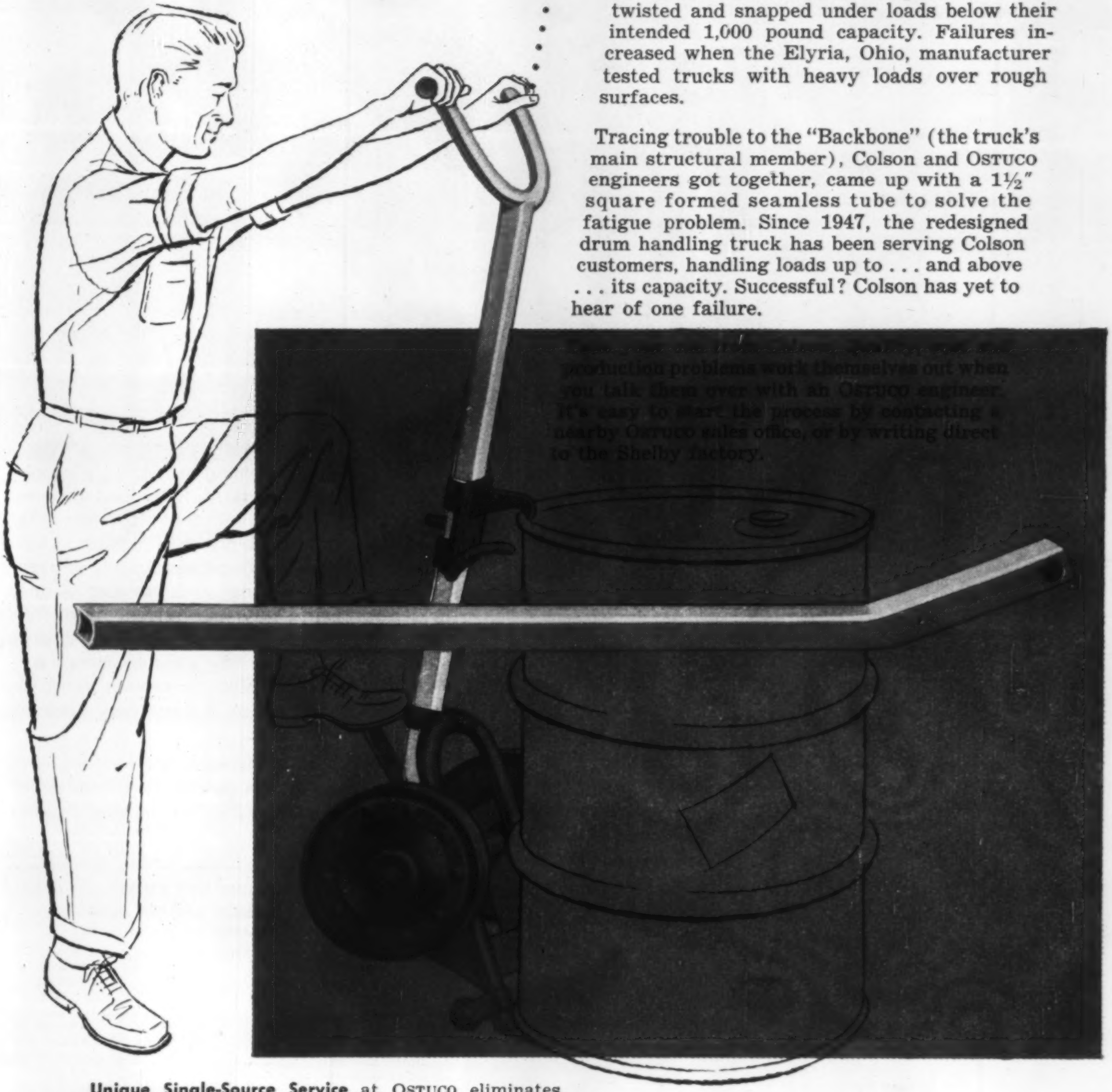
Colson cures
barrel-truck fatigue with

STRONGER BACKBONE FROM OSTUCO

First experimental models of Colson Corporation's barrel and drum handling truck strained, twisted and snapped under loads below their intended 1,000 pound capacity. Failures increased when the Elyria, Ohio, manufacturer tested trucks with heavy loads over rough surfaces.

Tracing trouble to the "Backbone" (the truck's main structural member), Colson and OSTUCO engineers got together, came up with a 1½" square formed seamless tube to solve the fatigue problem. Since 1947, the redesigned drum handling truck has been serving Colson customers, handling loads up to . . . and above . . . its capacity. Successful? Colson has yet to hear of one failure.

[illegible] production problems work themselves out when you talk them over with an OSTUCO engineer. It's easy to start the process by contacting a nearby OSTUCO sales office, or by writing direct to the Shelby factory.



Unique Single-Source Service at OSTUCO eliminates interplant shipment and error . . . another reason why your product can be improved when components are made from

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SEAMLESS AND ELECTRIC WELDED STEEL TUBING
—Fabricating and Forging

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of Copperweld Steel Company • **SHELBY, OHIO**
Birthplace of the Seamless Steel Tube Industry in America
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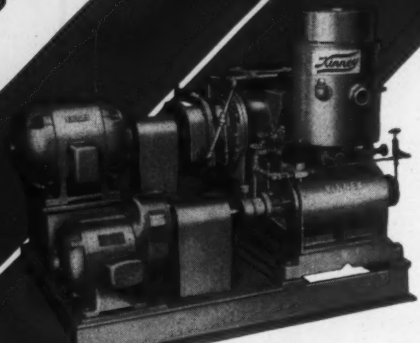
VACUUM MELTING OFFERS NEW POTENTIALS



Superior metals . . . extra strong, extra tough, extra pure . . . are becoming increasingly important to industrial progress. Metallurgical vacuum processing . . . offers new potentials to meet the severest performance demands of modern industry. High vacuum melting has already proven that vacuum furnaces can produce metals and alloys possessing new properties of extraordinary cleanliness, strength, toughness, and uniformity . . . and Kinney Vacuum Pumps are demonstrating their ability to provide dependable, trouble-free service in these new vacuum metallurgy installations.

If high vacuum melting is the field you are considering, look at the outstanding features of Kinney's Model KMB-1200 Mechanical Booster Vacuum Pump.

MODEL KMB-1200 TWO STAGE
MECHANICAL BOOSTER VACUUM PUMP
SPECIFICATION DATA

Ultimate Pressure (McLeod Gauge)	0.1 Micron
Free Air Displacement	1230 CFM
RPM	1800/250
Motor H.P.	10 and 5
Oil Capacity	6 gal.
Cooling	Water
Shaft Seal	Mechanical
Shaft Diameter	1½" and 1⅛"
Inlet Connection	8" Flanged
Outlet Connection	2" Screwed
Separator Tank	Kinney Swirl
Net Weight, Complete	3380 lb.

Complete technical data and performance curves of the Kinney Model KMB-1200, KDH 130 Mechanical Booster Vacuum Pump are available upon request. Competent vacuum engineers . . . in all our district offices . . . will be glad to discuss your vacuum problems with you . . . and prove how a Kinney High Vacuum Pump can make your vacuum metallurgy operation more economical. Send coupon for details. Kinney Mfg. Division, Boston 30, Massachusetts.

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Looking Back at 1955

January

THE STEEL INDUSTRY starts the new year with nearly 1.5 million more tons of ingot capacity than last year. The new high: 125,828,310 net tons.

The Democrats begin the year with control of Congress.

STEEL tells its readers that the metalworking outlook is good, says a return to 1953 volume is likely. But the CIO sees "no indication that a return to full employment is in sight." (January unemployment figures show 3.3 million out of work; 60.2 million on the job.)

The outlook is for the third best automotive year in history. Steel production starts off at 80.5 per cent of capacity and soon rises to over 2 million tons a week for the first time since 1953.

Business looks good to Benjamin F. Fairless. The U. S. Steel Corp. chairman conservatively estimates that steel production will hit 95 million tons. Adm. Ben Moreell, chairman of Jones & Laughlin Steel Corp., says 111.9 million tons.

The Federal Reserve Board eyes the stock market and raises margin requirements from 50 to 60 per cent. Sen. J. William Fulbright (Dem., Ark.) does some looking, too, and calls for a "friendly" investigation of the stock market.

Machine tool orders hit $60 million this month, a 16-month high.

U.S. clamps down on technical news

Auto output is 33 per cent above the old January high. A CIO official warns that the reckless auto production race will bring "inevitable unemployment" later in the year.

U. S. Steel plans $360 million for expansion and modernization in 1955. STEEL's Industrial Production Index hits 140, higher than in boom 1953.

February

DIRECTORS of Armco Steel Corp. vote a 2-for-1 split of common stock. Bethlehem Steel Co. starts a $100-million expansion program at Sparrows Point, Md.

The government bans exports of refined copper during February and March. A limit of 12,000 tons of copper scrap may be exported. The copper price in London rises 5 cents a pound as a result of a severe strike at Rhodesian mines.

Electricity output tops 10 billion kw-hr in a week for the first time. At about the same time, makers of power transformers and switch gears have a "white sale."

Employment in February drops under 60 million. Unemployment is 3,383,000.

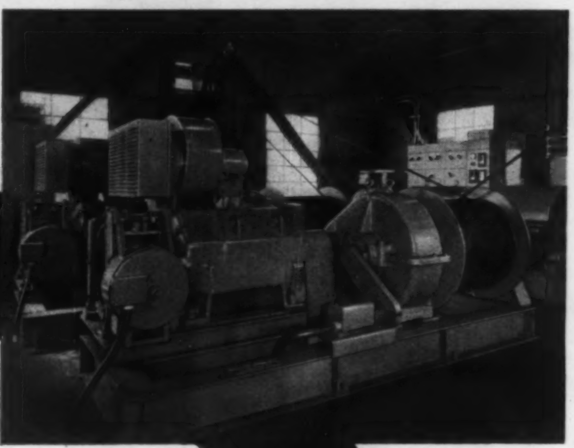
The American Federation of La-

Elliott equipment helps feed

W6-1

An enlarged view of one of the two coal barge unloaders at the Clifty Creek Station shown above. Designed, built, and erected by Heyl & Patterson, Inc., Pittsburgh. It is rated at 1100 tons per hour and uses a 12-ton grab bucket. Elliott motors, generators and control are in the house at top.

the giants!



ott 187½-hp Frame 616 protected forced- hold and close drive mill-type d-c motors um through gears. They operate at ap- 5 volts and 685 rpm.

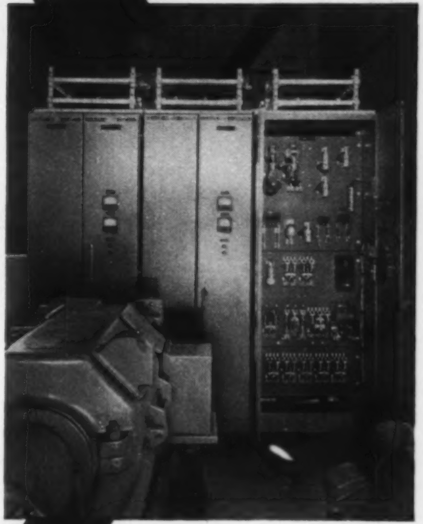
THE TWO LARGEST POWER PLANTS ever built by private enterprise—the Clifty Creek and Kyger Creek stations of the Ohio Valley Electric Corporation—supply power to the U. S. Atomic Energy Commission's uranium diffusion plant near Portsmouth, Ohio. The tremendous coal requirement of these plants is supplied via barge on the Ohio River.

Elliott C-W adjustable-voltage motors, motor-generators and control, are helping to assure high-speed, efficient operation for the coal unloading equipment at these stations. There are two coal barge unloaders at the Clifty Creek Station shown here, and two at the Kyger Creek Station.

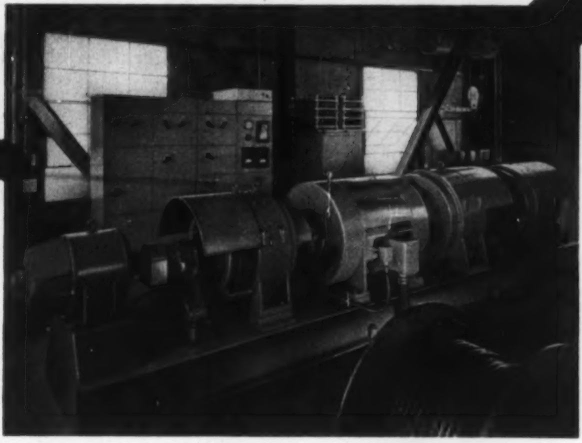
The five-unit motor-generator set provides power for hoist and trolley motors as well as the necessary excitation for the motor fields, brakes, regulators, and control circuits. All driving motors are 600-series, heavy-duty mill motors, and the generators of the m-g set have special characteristics suitable for regulator control and peak capacity of these motors. It pays to check with Elliott for up-to-date, engineered installations like this. For details, write Elliott Company, Crocker-Wheeler Division, Jeannette, Pa.

ELLIOTT Company

STEAM TURBINES • MOTORS • GENERATORS • DEAERATING HEATERS • EJECTORS • CONDENSERS • CENTRIFUGAL COMPRESSORS • TURBOCHARGERS • TUBE CLEANERS • STRAINERS



94-hp, Frame 612, 230-volt protected nated mill-type d-c trolley motor, which is ed at approximately 317 volts and 710 rpm. trol cabinets in background.



A five-unit, adjustable-voltage, motor-generator set consisting of a 400-hp, 1150-rpm, 2300-volt squirrel-cage induction motor driving two 200-kw, 345-volt d-c generators for the hold and close drives, one 75-kw adjustable voltage auxiliary generator for trolley drive, and a 15-kw, 250-volt d-c constant potential exciter.

bor and the Congress of Industrial Organizations agree to merge.

The rising tide of auto production sweeps over the old record as

Demand for metals rises

167,332 cars are made in a week. Rejuvenated Chrysler products sell well. The company nears its goal of 20 per cent of the market, grabs 18 per cent of sales.

Orders for machine tools climb for the third straight month; the order index for February stands at 209.7 (1945-47=100).

Ore prices of Cleveland-Cliffs Iron Co. and Oliver Iron Mining Division of U. S. Steel are hiked 10 to 20 cents a ton.

March

H. H. CURTICE, president of GM, ups his earlier prediction (6.8 million units) for the auto industry. Now he thinks 7.5 million cars and trucks will be "built and sold" this year.

General Electric says the CIO electrical workers are "barking up an empty tree" in calling for GAW.

About 500,000 workers get jobs as civilian employment rises to 60.5 million and unemployment drops to 3.2 million.

McLouth Steel Corp. unveils its $7-million oxygen process steel plant.

Primary aluminum production tops 260.5 million lb in March for a new high. First quarter production, 749.4 million lb, is also a record.

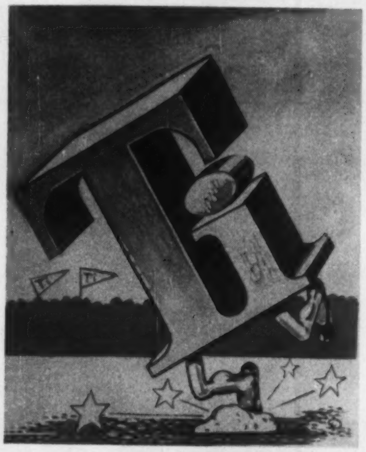
Industrial production climbs to the best level since October, 1953—135 per cent of the 1947-49 average.

The Senate turns down Democratic proposals to cut personal income taxes. It extends existing corporate income and excise rates.

A proposal for a $300-million conveyor belt (100 miles long) to haul ore and coal is sidetracked by the Ohio Legislature. Ice in Lake Superior (the most since 1933) delays the start of the ore shipping season but the prediction is that 60 million to 80 million gross tons of ore will be brought down this year.

CIO auto workers vote for a $25-million strike fund to put teeth in its demands for GAW. Union members have to ante up an extra $5 a month.

First quarter crawler tractor shipments are $76 million, $6 million over the previous quarter. Excavating and earthmoving equipment shipments are $148 million, 8 per cent over the fourth quarter of 1954.



Titanium trips after promising start

First quarter auto production establishes an all-time record—2.1 million cars.

GMs' sales and earnings set new records in the first quarter. Sales are $3.1 billion; net profit, $309 million. And Chrysler's comeback fight shows results. First quarter earnings are $3.96 a share, compared with 88 cents in the similar period of last year.

April

OUTLOOK for stampers is bright; sales promise to be 10 per cent better than last year's.

Stocks of Lake Superior iron ore drop to 22.1 million tons the week before Inland Steel Co.'s ship,

1955
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Second quarter booms

the *E. J. Block*, opens the Great Lakes ore shipping season.

The price of zinc goes up ½-per cent to 12 cents a pound, the first price change in seven months.

Cars sell so fast that Ford dealers claim they have only a ten-day supply.

Employment reaches 61.7 million, as the number looking for jobs falls under 3 million.

Stockholders approve the sale of all Mackintosh-Hemphill assets to E. W. Bliss Co., Canton, O. Republic Steel Corp. plans a $35-million expansion. Jones & Laughlin Steel Corp. will spend $50 million on its Pittsburgh and Aliquippa, Pa., works.

Farm equipment sales show a rise in the six months ending Apr. 30—business is up 12 to 23 per cent.

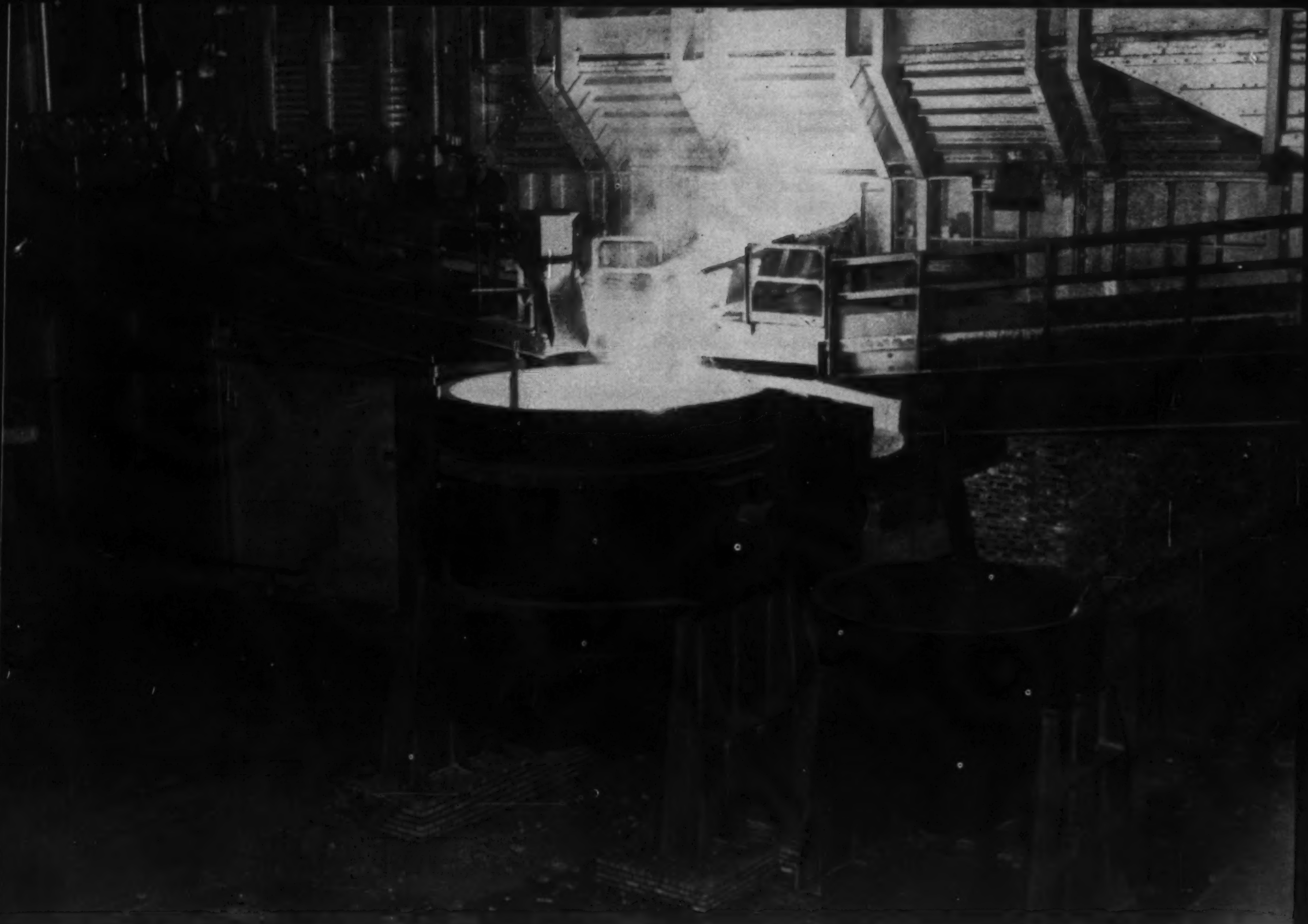
CIO steelworkers send notice to 96 companies that they want a sizable pay boost.

May

THE UAW picks Ford as its prime target for GAW as it extends the General Motors contract six days past the expiration date of the Ford contract.

Benjamin F. Fairless steps down at U. S. Steel Corp.; Roger M. Blough becomes chairman and chief executive officer.

STEEL's Industrial Production Index hits an all-time high of 151



(Photo courtesy of Detroit Steel Corp.)

Ultra-Modern

Tapping the first heat from one of four 250 ton open hearths designed and built by Loftus at Detroit Steel's new Portsmouth Plant.

Loftus OPEN HEARTH DESIGN

Loftus has engineered and erected 81% of all the new open hearth capacity installed since 1938 by independent engineer-contractors. Behind these installations is "know-how" acquired and developed over the years by an organization which offers a "package" service to the entire steel industry. From drawing board to first tap, your problems will be solved by specialists with experience, explaining why "Loftus Builds 'em Better."

• increases availability
• promotes lower cost operation

Loftus Open Hearth design and construction combines proven experience with completely modern furnace concepts. It assures you of a better, more automatic furnace with less down time. Lower operating costs are more than just a possibility.

LOFTUS OPEN HEARTH DESIGN INCLUDES:

- Completely Automatic Reversal
- Full Sloping Back Wall Between Port Throats
- Water-cooled Doors with Archless Frames
- Water-cooled Front Buckstays
- Basic Suspended Ends Including the Port End Arches
- Flat Suspended Fantails and Regenerator Roofs
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Loftus ENGINEERING CORPORATION
Designers and Builders of Industrial Furnaces
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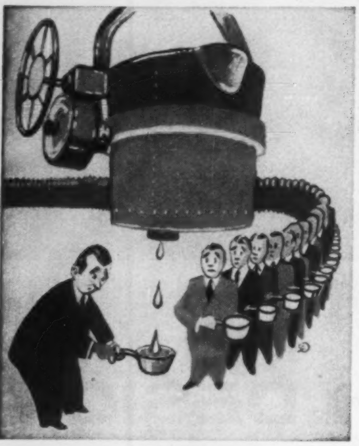
(1947-49=100) as Detroit makes its 3-millionth car of the year. Steel production hits a new high, 2,328,000 net tons in a week; operations are at 96.5 per cent of capacity.

Employment rises almost a million; unemployment drops 800,000.

The Ford Foundation says it will sell nonvoting Ford Motor Co. stock.

Chairman Edward F. Howrey of the Federal Trade Commission warns corporate mergers will get tougher treatment at government hands. The commission reports mergers are three times their 1949 rate.

Packard production reaches the total for all of last year. President James A. Nance of Studebaker-Packard Corp. says Packard Division is on target for its sales goal of 100,000 cars this year.



Nickel shortage worsens

Ford counters the UAW demand for a Guaranteed Annual Wage by offering the workers a chance to buy stock at one-half the market price. The union retorts: No!

Arthur B. Homer, president of Bethlehem Steel Co., predicts steelmaking capacity will increase 60 million tons in the next 15 years.

Orders for industrial supplies and machinery hit 191.6 (July 1948 =100), highest since 1951.

The last week in May sees another steel production record, 2,340,000 tons. Operations are at 97 per cent of capacity.

Dealers' stocks (705,000 cars at end of May) worry some. But General Motors' sales set a record of 353,556, up 38 per cent over May, 1954.

The Pennsylvania Railroad's earnings in May, $5.1 million, are the highest for the month since 1945.

June

SILVER'S increasing industrial use raises price to 90½-cents an ounce.

Benjamin F. Fairless, newly elected president of the American Iron & Steel Institute, presents three Gary Medals. Recipients: Tom M. Girdler, Republic Steel Corp.; Charles R. Hook, Armco Steel Corp.; Ernest T. Weir, National Steel Corp.

An auto strike is averted as the UAW settles its demand for a Guaranteed Annual Wage by accepting Supplemental Unemployment Pay. Ford gets a three-year contract; GM signs a similar one a week later.

GM announces a $500-million expansion and Ford will build an engine plant in Lima, O.

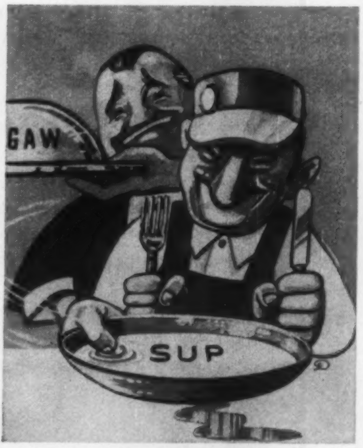
Another record—steel mills, running at 97.5 per cent of capacity, make 2,353,946 tons of steel.

Jobs for 1.3 million more workers bring the total employed to over 64 million for the first time.

Iron starts to flow from Great Lakes Steel Corp.'s new blast furnace—it has a 30-ft hearth.

Tom M. Girdler turns over duties as chief executive officer of Republic Steel Co. to Charles M. White.

Car production for the first six months is a record 4.3 million.



Auto workers get SUP for GAW

Shipments of aluminum castings are equal to the 1948 total.

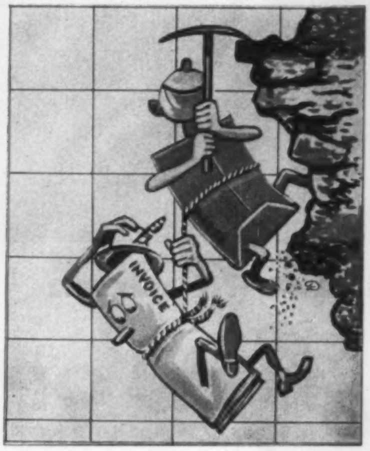
The government has a record loss of nearly $800 million in supporting farm prices during the year ending June 30.

U. S. Steel's dollar sales, net earnings and tonnage shipments in the second quarter are the highest in its history.

Steel production for the first half of the year totals 57.4 million net tons, second only to the 57.9 million tons made in 1953's first half. Steel producers start shutting down their furnaces in preparation for a strike.

July

THE SHORTEST steel strike on record, 12 hours, is settled when U. S. Steel agrees to an average wage boost of 15 cents an hour.



Steel wages, price rise

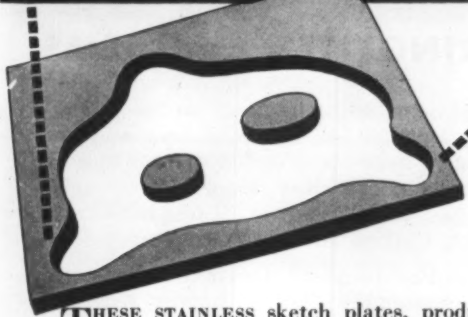
New steel prices, following on the heels of the settlement, show an average increase of $7.35 a ton, a 5.8 per cent jump.

A strike at Kennecott Copper Corp. and Phelps Dodge Corp. halts 60 per cent of U. S. copper production.

Directors of General Motors vote for a 3-for-1 stock split.

Copeland Refrigeration Corp., maker of air conditioning compressors, asks employees to skip vacations so it can catch up with orders.

Employment is at record levels; 65 million are working; only 2.5 million are out of work. But farm and factory product prices reach



This customer saved 46% in freight charges

on these stainless steel plates

THESE STAINLESS sketch plates, produced by G. O. Carlson, Inc., saved the customer 46% in shipping costs. If he had bought rectangular plates and done his own cutting, he would have paid freight on excess material which he could not use.

Then too, cutting and machining facilities were quite limited at the job site. Time and money were saved by having Carlson cut and machine the plates to the accurate tolerances specified.

For your next work involving stainless steel plates, heads and other stainless products, let us show you how—*and how much*—you save by buying from G. O. Carlson, Inc.

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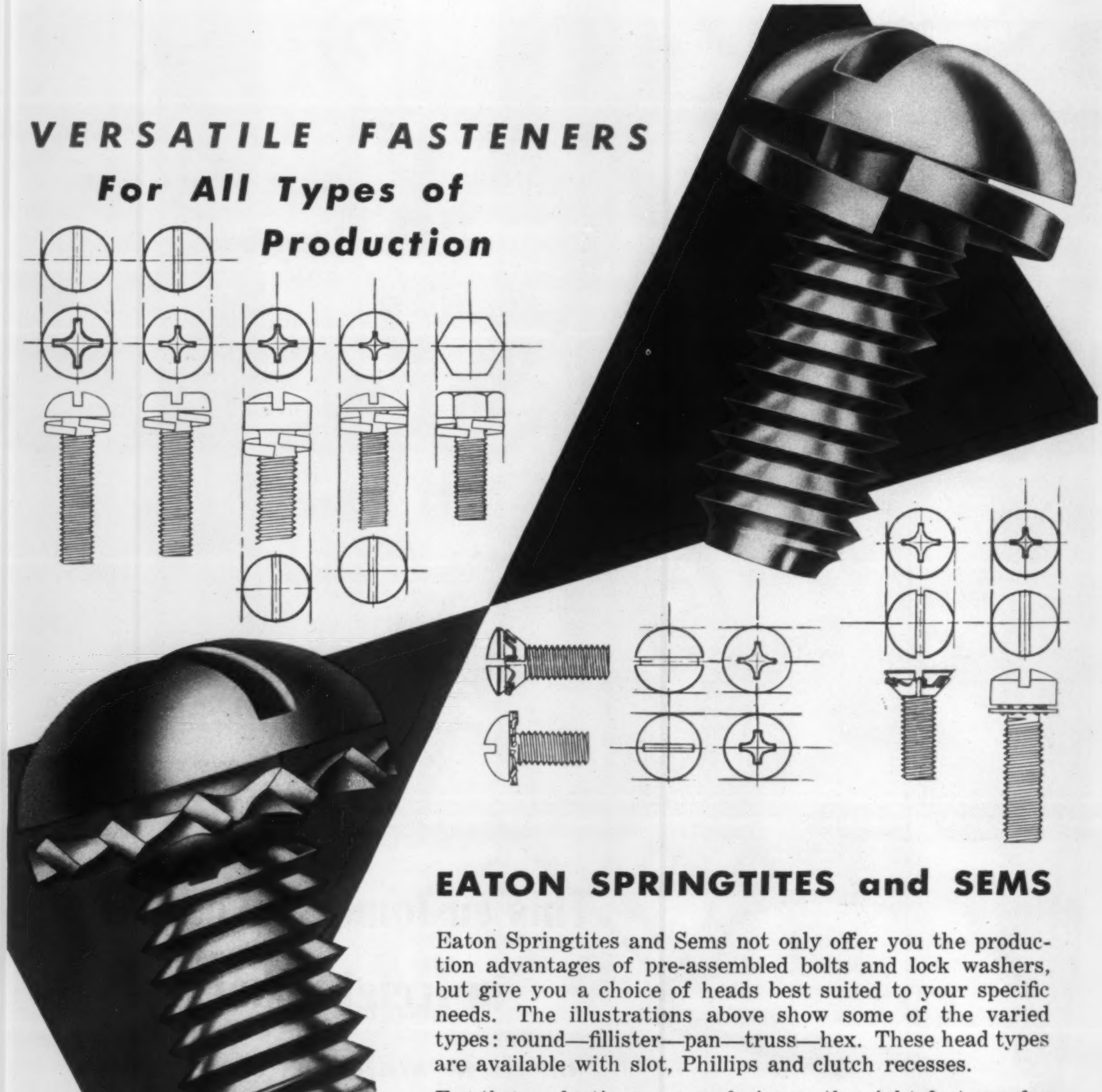
For All Types of Production



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Eaton Springtites and Sems not only offer you the production advantages of pre-assembled bolts and lock washers, but give you a choice of heads best suited to your specific needs. The illustrations above show some of the varied types: round—fillister—pan—truss—hex. These head types are available with slot, Phillips and clutch recesses.

For the production man or designer, the right fastener for the job means faster assembly (can be hopper fed) and better end products. As with all Reliance fasteners, Eaton Springtites and Sems are under quality control supervision from raw material to finished product. Get the complete cost-saving story—write for Engineering Bulletin S-49 today.

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PRODUCTS: Sodium Cooled, Poppet, and Free Valves • Tappets • Hydraulic Valve Lifters • Valve Seat Inserts • Jet Engine Parts • Rotor Pumps • Motor Truck Axles • Permanent Mold Gray Iron Castings • Heater-Defroster Units • Snap Rings Springtites • Spring Washers • Cold Drawn Steel • Stampings • Leaf and Coil Springs • Dynamatic Drives, Brakes, Dynamometers their widest spread since the end of World War II.

The government ends fiscal 1955 in the red ($4.2 billion). This is $300 million less than forecast by the President last January.

Federal curbs on iron and steel scrap exports stay on as steel demand tightens. Expected summer cancellations of steel orders fail to materialize. Adm. Ben Moreell says the recent steel price increases are not enough.

In spite of heavy production, inventories make little headway against the buying urge. The Commerce department estimates July inventories at $43.9 billion, only 2 per cent above the 1954 low point.

August

STEEL's Industrial Production Index hits a new high, 156 per cent of the 1947-49 average. Employment reaches 65.5 million in August to set a record for the third consecutive month. Unemployment falls to about 2.2 million, a 22-month low.

Railroads resume buying

Reynolds Metals Co. plans to spend $230 million to boost its aluminum production 270 million lb.

Defense Mobilizer Arthur S. Flemming says 2 million lb of nickel are to be diverted from the government's stockpile this month because of the critical shortage.

Hot weather, vacations, furnace repairs and labor troubles slow down steel production to 90 per cent of capacity.

Domestic copper is increased from 36 to 40 cents a pound, the highest price since 1872. Another increase follows, boosting the price to 43 cents.

Flood damage strikes Connecticut brass companies and puts damper on operations at Bethlehem Steel.

New claims for unemployment compensation drop to the lowest level in two years.

General Motors Acceptance Corp. tightens credit—a ¼-per cent boost—the second rise in a month.

Great Lakes iron ore shipments hit a high point, 3,164,011 gross tons in the week ended Aug. 29—66 per cent over the like week in 1954. Production in August is a record 140 as measured by the Federal Reserve Board production index.

September

UNEMPLOYMENT falls to 2.1 million, the lowest in nearly two years.

Republic Steel plans a $130-million expansion program to boost capacity 1.6 million tons, 16 per cent.

CIO electrical workers go out on what proves to be a long strike at 27 Westinghouse plants.

Ralph J. Cordiner, president of General Electric, says sales for the year will top 1953's record of $3.1 billion.

International Harvester truck sales are 35 per cent over last year's.

Railroad freight shipments for the week ended Sept. 10 are 17.5 per cent greater than a year ago, the widest margin so far.

Model change-overs take a big bite out of auto production. Ford's new models come out with 10 per cent more horsepower and safety options. Prices are $46 to $99 higher.

Western Electric Co. says it will use aluminum instead of copper in making cable wire. Its reason: Spiraling copper prices and repeated shortages.

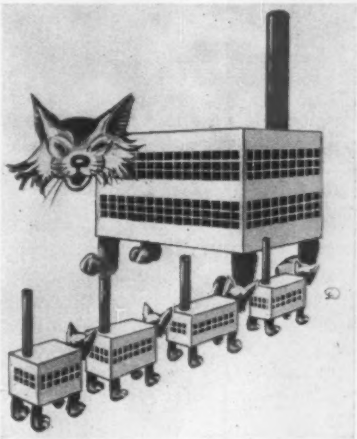
Arthur S. Flemming, defense mobilizer, ends fast tax write-offs for much of the aluminum and steel industry.

The American Die Casting Institute meeting in Chicago points up the boom in diecasting. Aluminum diecasting sales are 75 per cent over 1954's and 53 per cent over 1953's. Zinc diecasters are 54 per cent ahead of last year and 25 per cent ahead of record 1953.

President Eisenhower's heart attack gives the stock market its worst tumble (a drop of 6.54 per cent) since October, 1929, and raises a lot of speculation about 1956 presidential race.

Ford Division of Ford Motor Co. ups its capacity by 250,000 cars since last year, a 15 to 20 per cent expansion.

Chrysler Corp. plans an $85-million fabricating and stamping plant in northeastern Ohio.



Industrial expansions multiply

General Motors' sales are $9.5 billion for the first nine months; profits set a record, too.

October

FORD MOTOR CO. plans a $500-million expansion in 1956, will spend another $500 million over 1957 and 1958 for plant expansion.

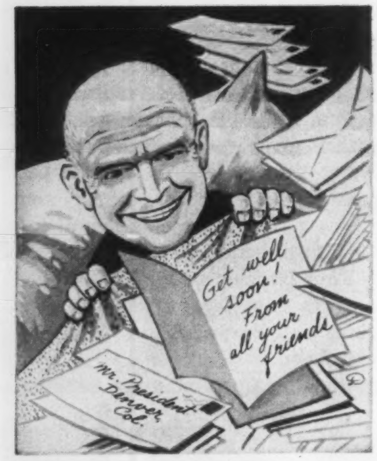
Employment is at a record level, 65.2 million. Machine tool orders ($103.4 million) are the highest since July, 1952.

C. M. White, president, of Republic Steel Co., says incoming orders "point to capacity operations through the first half of 1956." Steel production exceeds that of last year.

A 45-point drop in two weeks of stock market trading leaves manufacturing unaffected.

The latest weekly record of steel production is 2,386,000 net tons.

The Interstate Commerce Com-


Get well soon! From all your friends
Mr. President Denver Col.

Ike's heart attack shocks nation

mission makes the 12 and 15 per cent rail increases of 1952 permanent. Zinc drops to 13 cents after a try at 13½-cents flops.

More steel expansion: Jones & Laughlin Steel Corp. will spend $115 million to increase capacity by 700,000 tons a year. Wheeling Steel Corp. will spend $65 million. Inland Steel Co.'s three-year plan will add 800,000 tons of capacity (cost: $260 million).

November

STEEL OPERATIONS are at full blast—at 100 per cent of capacity 2,413,000 net tons are made in one week. A tight steel supply situation is expected to continue through the first half of 1956.

A freight car shortage has grown from an average daily deficit of 9925 cars in mid-June to 21,542 a day.

Ernest R. Breech, Ford chairman, says the company's profits in the first nine months are greater than in any other full year.

Joseph C. O'Mahoney (Dem., Wyo.) heads a Senate subcommittee study of General Motors. The question: Is it too big?

Chrysler will spend more than $1 billion in five years for expansion.

The CIO's plans for SUP hit a snag as Ohio voters reject a proposal to combine public unemployment compensation with SUP and raise state benefit levels.

STEEL's Industrial Production Index hits an all-time record of 160; the following week it goes to 162.

National Steel Corp. plans to spend $200 million to $225 million for expansion. It will add 100,000 tons of capacity in 1956, 500,000 tons in 1957 and 200,000 tons in both 1958 and 1959.

Gearmakers, drop forgers and other metalworking firms are plagued by shortages of nickel alloy and carbon steels.

A shortage of steel plate begins to hurt and the lack of structural steel holds some fabricators to a 4-day work week. A lead shortage appears.

W. J. Simmons, Chrysler treasurer, says 1955 auto sales are not abnormally good. They merely "give concrete evidence of the underlying strength of consumer demand for automobiles."

Machine tool orders climb

More freight cars are ordered this month than ever before. Orders total 51,066 cars. Backlog exceeds 109,000 cars.

December

THE MERGER of the year: The CIO and AFL combine in a joint convention in New York. Its membership: 15.4 million.

Automakers plan the largest assemblies in history for December. Total for the year is about 8 million cars.

Tool and die makers see a record year in 1956. Reason: Orders for completely new 1957 model cars. Aluminum supplies look tight until 1957.

The ore shipping season ends. About 87.5 million tons were brought down the lakes.

A tight copper supply is made worse as 16,000 workers go on strike at three U. S.-owned mines in Chile.

At mid-month, ingot production of steel zooms past the 1953 record of 111.6 million net tons. But shortages appear. Decision of steel mills to use January as the month to catch up on their back orders causes a lot of furrowed brows. Scattered price increases make news.

One ray of sunshine reaches Westinghouse strikers: The company offers a $100 advance to brighten up Christmas for its workers.

Steel production sets another record: By operating at 100.3 per cent of capacity, the industry made 2,421,000 net tons of steel in a week.

Structural steel backlogs rise to about 1.8 million tons—50 per cent higher than a year ago.

Steel scrapmaking prices climb $1.34 in one week, to hit an unprecedented $50.17 a gross ton. The price a year ago was $32.42.

Kaiser Aluminum plans a $280-million expansion which will make it the nation's second largest producer of aluminum.

Tapered-off buying of cars sends inventories upward. Auto output contracts to eliminate overtime.

AFL, CIO merge

Next year looks like a repeat of this one in reverse—full blast in the first half, perhaps a little slower in the second.

And then there is the election to liven things up.

℞ FOR ROLLING MILL HEADACHES

ROLLING MILLS—For almost a century, Farrel mills have been helping to solve rolling mill production problems. They are built in a wide range of types and sizes for rolling nonferrous rods, strips or sheets, metal foils and cold strip steel. Farrel also designs and manufactures coilers and special handling equipment required to make each installation a complete production unit.

MILL DRIVES—Specially designed to suit individual requirements, Farrel reduction gear drives, pinion stands and combination units are built in any size for any capacity. Combination units have the reduction gears and mill pinions in a compact, integral housing.

ROLL GRINDERS—Available in two types and nine standard sizes, Farrel roll grinders enable you to fix and maintain definite standards of accuracy and finish. Rolls are produced with a flawless surface, free from marks of any kind, ground straight, or with concave or convex contours of exact symmetry and accuracy.

Information and engineering consultation available, without obligation.

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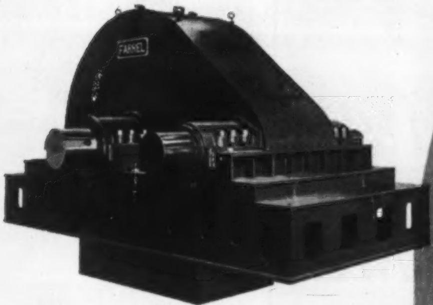
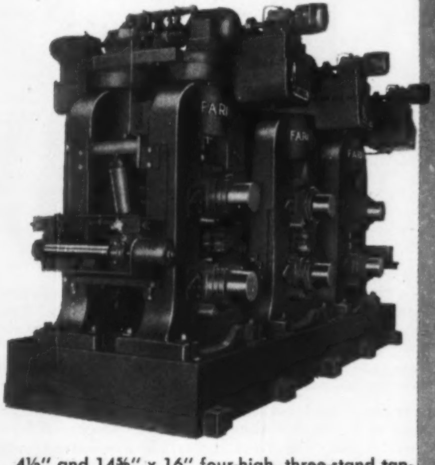


5500 HP Herringbone geared reduction unit designed to transmit power to a 134" three-high, sheared plate mill.



4½" and 14⅝" x 16" four-high, three-stand tandem mill for rolling nonferrous strip.

Farrel heavy-duty roll grinder.

1956 AUTOMOBILE SHOW

Here's one feature all 1956 cars have in common ...thanks to AMERICAN

Any auto show will quickly show you a "familiar face", literally millions of times over . . . the good-looking, unmarred head of the *Phillips* cross-recessed Screw. For it's a matter of record that, since American first introduced the Phillips Screw to industry, auto makers have come to use more and more of these modern fasteners until now most of the industry is standardized on Phillips . . . as one look at your own car will tell you.

And why has Phillips fastening been so widely adopted in the world's most cost-conscious, competitive industry? Ease of handling . . . speed and straightness of driving . . . unscarred work-surfaces, uninjured workers, no rejected work, no lost time. In fact, time savings overall run up to 50%. ***So the auto industry knows that Phillips Screws always cost least to use.***

And many auto makers bank on American to keep their assemblies rolling without a hitch. For they know that American has the volume capacity and the inflexible inspection systems that assure prompt delivery of top-quality Phillips fasteners of any type, size or metal. Likewise, *you* can get fastener problems off your mind once for all . . . ***just turn them over to American.***

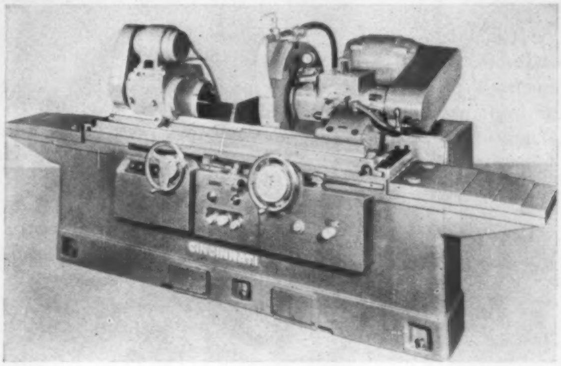
✖ *marks the spot . . . the mark of extra quality*

AMERICAN SCREW CO.

PHILLIPS HEADquarters
WILLIMANTIC, CONNECTICUT

Plants at Willimantic, Conn. and at Norristown, Pa.
Warehouse and office at Chicago
Office, Detroit, Michigan

Grinding Machine Balances Grinding Wheel Automatically



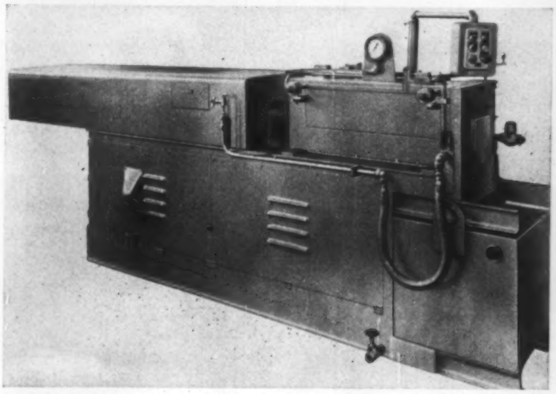
This line of machines for traverse and infeed grinding is said to give the highest quality finish in the shortest time.

Bearings in the grinding wheel spindle consist of multiple segments, fixed axially. Radially, they are free to rock slightly.

The power table traverse is hydraulically operated and gives infinitely variable traverse rates from 3 to 200 in. a minute.

Length of table traverse may be controlled from the full rated stroke to as little as 3/32-in. Hand adjustments as low as 50 millionths on the work diameter can be made on infeed. *Write*: Cincinnati Grinders Inc., Marburg Ave., Cincinnati 9, O. *Phone*: Redwood 2121

Billet Descaler Cleans 32-in. Billet in Less than 2 seconds



A portable, self-contained and semiautomatic descaler removes forging scale from hot billets just before closed die forging operations.

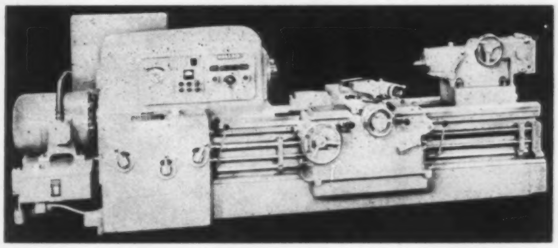
A small quantity of water is sprayed on the billet at high pressure before it is ejected automatically.

All billets up to 32-in. long and 6 in. in diameter can be handled by the descaler. It operates with either side or end feeding.

The unit is completely shrouded. Shrouds are easily removable for making adjustments.

A water cylinder connected to the actuating cylinder gives complete separation of water and oil. Valves, pumps and piping are mounted outside the oil reservoir. *Write*: American Steel Foundries, 1150-X Tennessee Ave., Cincinnati 29, O. *Phone*: Redwood 9210

Engine Lathe Calculates Spindle Speed Automatically



Series 80 lathes offer accurate, high-production turning, boring and facing of large pieces.

All four models have a range of 36 spindle speeds, from 8 to 1000 rpm or from 10 to 1250 rpm.

A Dyna-Shift headstock has two large dials; one for setting the work diameter to be turned, the other for setting the desired surface cutting speed.

When the dial settings are made and the control lever moved to the shift position, the headstock automatically and hydraulically shifts to the spindle speed needed to give the desired surface cutting speed.

All electrical controls are at the front of the headstock where the operator can reach them easily.

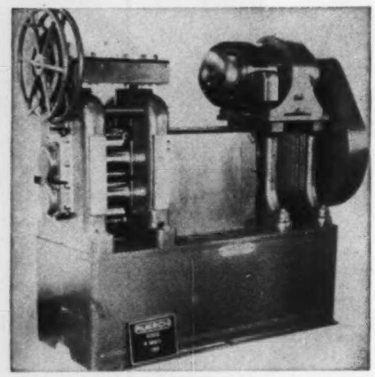
All headstock gears and bearings are lubricated by a high-pressure, mist-and-spray system.

The gearbox has a range of 48 threads, from ½ to 28 per inch. Feeds range from 0.003 to 0.168-in. per revolution. Clearance diameters are from 25 to 36 in. *Write*: Monarch Machine Tool Co., Sidney, O. *Phone*: 2-1381

Rolling Mills

A new line of precision rolling mills is built in a wide range of sizes and types for ferrous and nonferrous materials.

Both 2-high and 4-high mills are available. Sizes range from small, jewelry-type mills to large ones for high production rolling of materials up to 12-in. wide.



Uses: Hot and cold rolling of strip, sheet, rod and wire, as well as wire flattening, embossing and forming. *Write*: H. J. Ruesch Machine Co., 407 Mulberry St., Newark 2, N. J. *Phone*: Market 3-0759

High-Strength Bolts

New, 12-point, external wrenching bolts have tensile strengths of from 180,000 to 200,000 psi. They have exceptional resistance to dynamic fatigue or shock loading.

Endurance limits range from 50,000 to 60,000 psi. High fatigue resistance is built into the bolts by precision forming of the threads and controlled forging of the head.

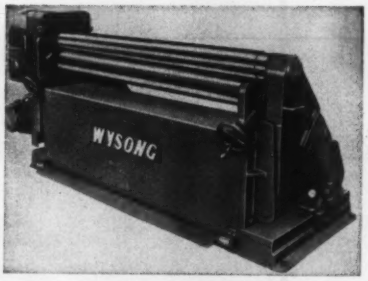
The bolts come in standard diameters from ¼ to 1½-in. *Write*: Standard Pressed Steel Co., Jenkintown, Pa.

Power Bending Rolls

These 6-in., all-steel rolls are made in lengths of 48, 60, 72, 96 and 120 in. The rolls are of the initial or pinch type.

A handwheel in the front of the machine gives parallel adjustment of the rear or forming roll.

Stepping on the safety treadle, which extends the full length across the front, immediately stops the machine.

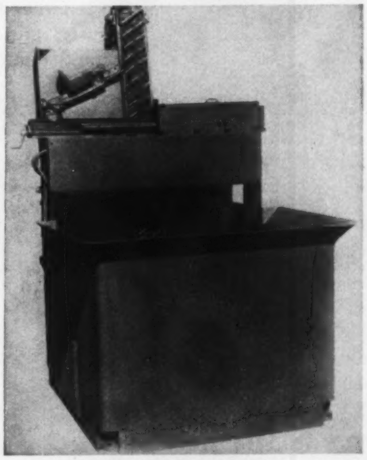


All three rolls are power driven and are made of accurately machined, alloy steel grooved to specifications. The drive is a 7½-hp, 1800-rpm motor. *Write*: Wysong & Miles Co., Greensboro, N. C. *Phone*: 5-2864

Automatic Hopper Feeder

The elevating conveyor feeds, transfers and pushes parts. It has a 10-cu-ft hopper and 6-in.-wide elevating belt.

Cylindrical parts from ¼-in. in diameter and ⅜ to 3 in. long to 1½-in. in diameter and 1½ to 3 in. long are handled.



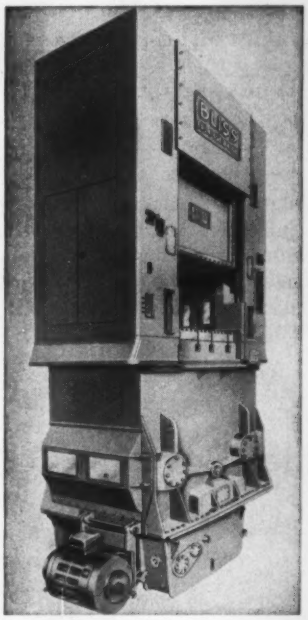
Power comes from a ¼-hp, 220/440-volt, 3-phase motor through a variable speed drive. *Write*: Feedall Inc., Willoughby, O. *Phone*: Willoughby 2-8100

Underdrive Press

This press eliminates a major cause of sticking at bottom center; its rockshaft develops maximum power without reaching dead center.

The rockshaft comes within a few degrees of bottom dead center when the slide is in the closed position. This gives an enormous mechanical advantage, because it permits maximum force at the dies without bringing the rockshaft to bottom dead center.

All operating mechanisms are concealed within the press housing, but transparent plastic windows in the uprights and gear case make it easy to inspect the parts during operation.

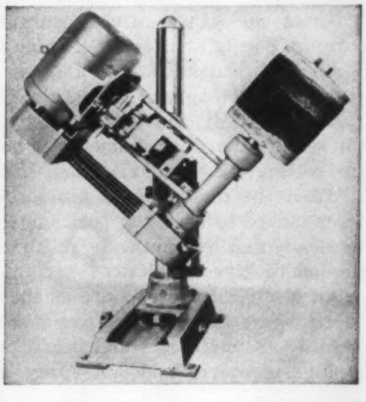


Presses have both high and low pressure lubrication systems. *Write*: E. W. Bliss Co., Canton, O. *Phone*: 7-3421

Polishing Wheel

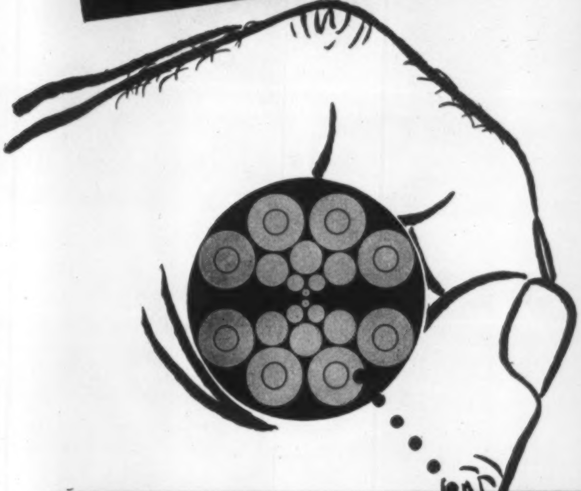
This wide-faced wheel gives even buffing and polishing to surfaces up to 24 in. wide.

Positioning of the workpiece is simplified, and once the proper pressure is established hundreds of



For Greater Precision

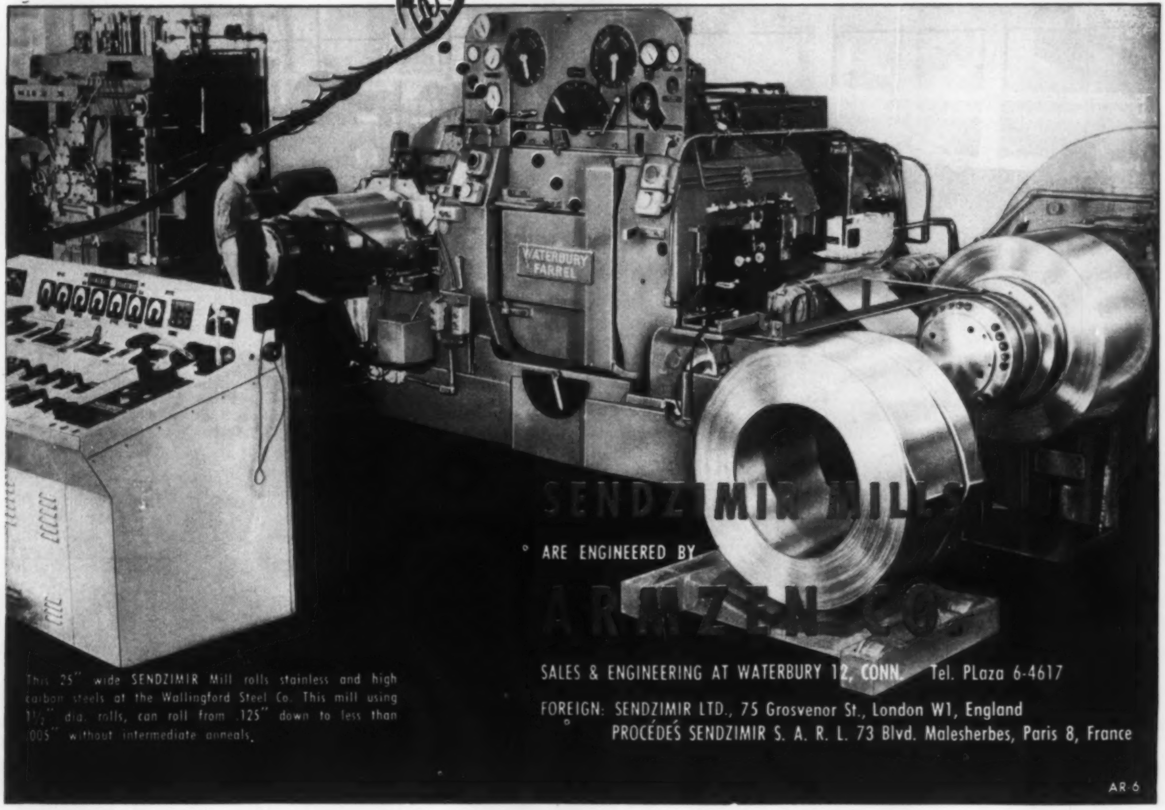
SENDZIMIR



LOCKS GIANT MILL POWER

into a Compact Housing

- Compact design—close, uniform support throughout mill maintains extreme accuracy of gauge.
- Greater reduction per pass.
- Eliminate intermediate anneals.
- Carbide work rolls retain ability to impart highest surface finish.
- Small diameter work rolls can be changed by hand in one minute—grinding minimized.
- Require much less space than conventional mills for same range of work. No overhead crane needed.
- Efficient and economical for small lots as well as long runs.



This 25" wide SENDZIMIR Mill rolls stainless and high carbon steels at the Wallingford Steel Co. This mill using 1½" dia. rolls, can roll from .125" down to less than .005" without intermediate anneals.

SENDZIMIR MILLS

ARE ENGINEERED BY

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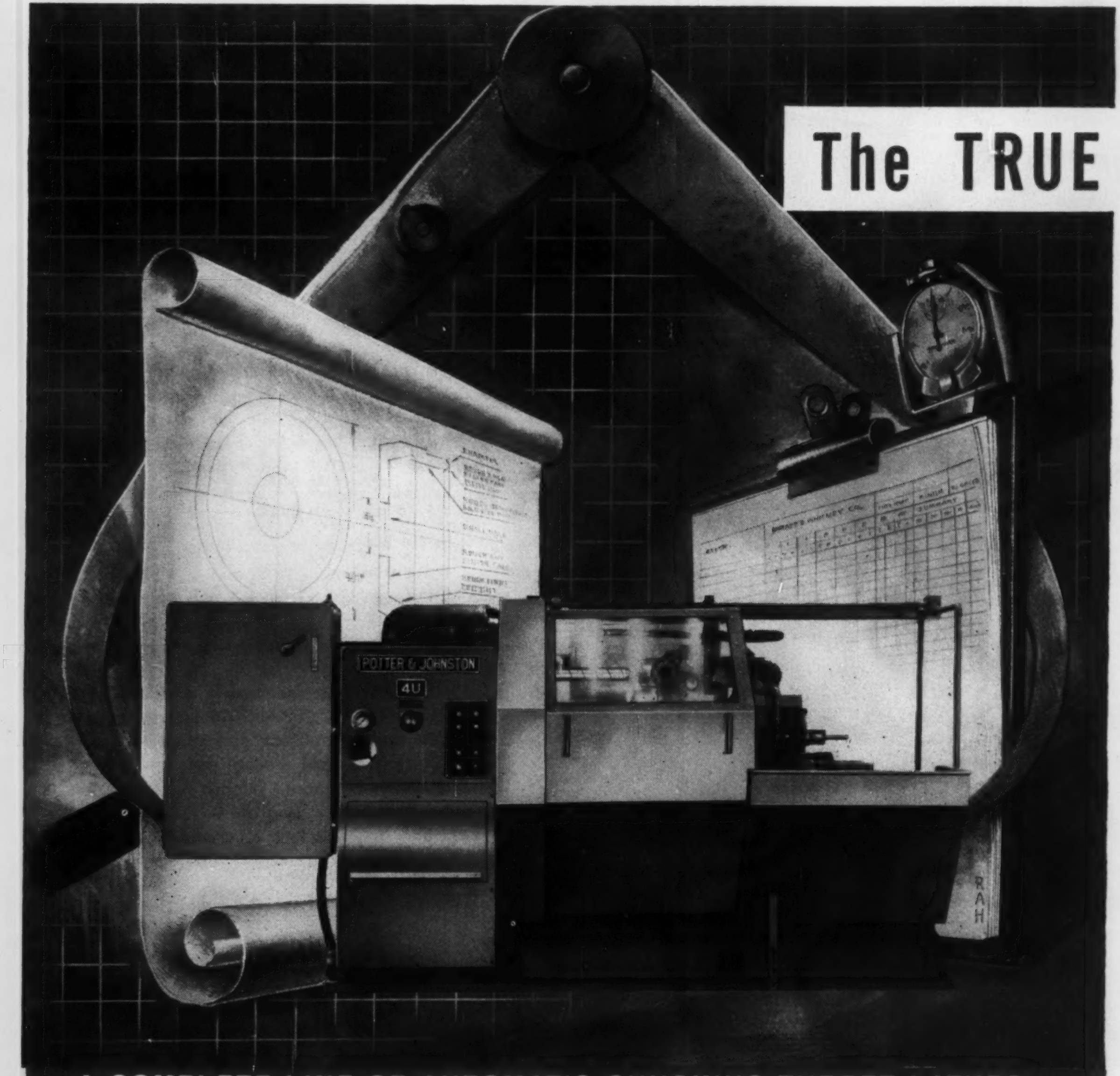
The TRUE



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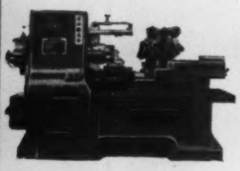
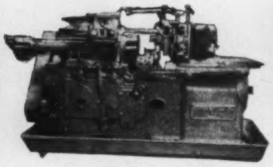
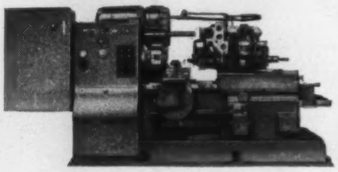
3-U SPEED-FLEX
A high speed machine for small parts. Spindle speeds to 1445 rpm. Chuck sizes: 6″-8″.



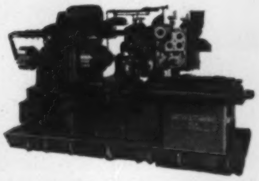
4-D AUTOMATICS
Two sizes, Standard and Elevated. Spindle speeds to 696 rpm. Chuck sizes: 10″, 12″, 15″.



4-U AUTOMATIC
A rugged workhorse with extra power for fast metal removal with carbide tools. Spindle speeds to 1177 rpm. Chuck sizes: 10″, 12″, 15″.



5-D POWER-FLEX
Three sizes: Standard, Elevated and Elevated with Long Travel. Spindle speeds to 610 rpm. Chuck sizes: 15″, 18″.



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YOU CAN DO THE JOB BETTER ON A POTTER & JOHNSTON AUTOMATIC**

MEASURE of PROSPERITY...

YOUR ABILITY TO PRODUCE!

Not dollars in the bank, but dollars invested in modern machine tools that increase your ability to produce . . . here is the *true* measure of your Company's prosperity today . . . and your assurance of *continued* prosperity tomorrow.

And before you invest, investigate the new Potter & Johnston Automatic Chucking Turret Lathes. Even on small quantity production of component parts, they have repeatedly proved efficient and economical. Now the advantages of divided labor costs can be brought to every type of production run. Amply powered and rigidly built to handle today's tough alloys with speed and accuracy, P&J Automatics provide the increased output and reduced production costs that pay BIG dividends to *every* plant, large or small.

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Precision Production Tooling for more than Fifty Years

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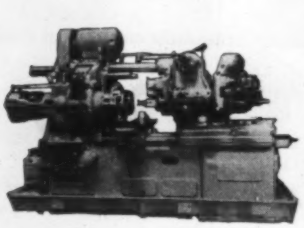
P&J Factory Representatives are available through your nearby Pratt & Whitney Branch Office

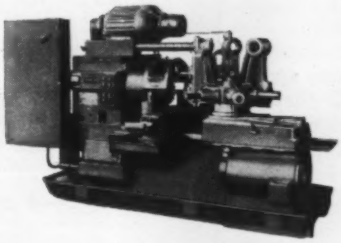
5-D Two Spindle POWER-FLEX

Added capacity with minimum initial cost and floor space. Two standard sizes: 5-D2-9" and 5-D2-15". Chuck sizes: 10", 12", 15".



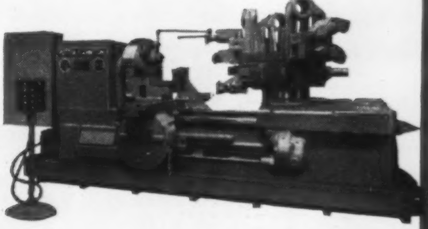
6D-40 AUTOMATICS

Two sizes with various combinations of travels and bed lengths. Spindle speeds to 471 rpm. Chuck sizes: 18", 24", 30".

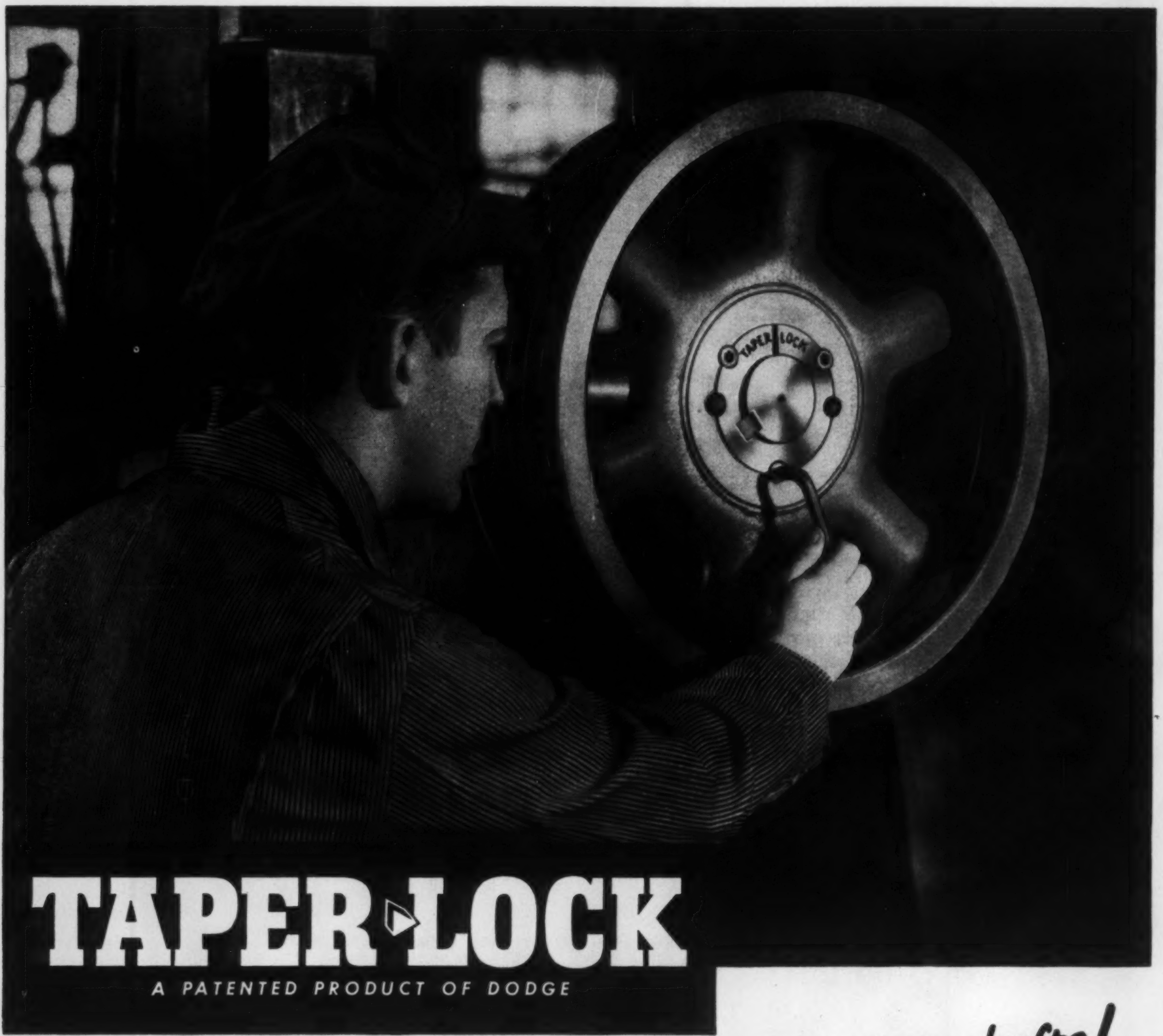


10-U AUTOMATIC

For new speed and economy on your really BIG jobs. Chuck sizes: 30", 36", 42".



MODERNIZE WITH POTTER & JOHNSTON . . . REPLACE FOR PROFIT



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A PATENTED PRODUCT OF DODGE

The simplest, surest means of mounting wheels to shafts!

Slip it on the shaft, line it up and tighten while sighting! Mount sheaves, sprockets, couplings, conveyor pulleys *quicker*—and more easily—with Taper-Lock bushings. A few twists of a hex wrench and Taper-Lock grips the shaft with the firmness of a shrunk-on fit. It comes off as easily, without shock to bearings or machinery. Bushing seats evenly along entire length of the hub—*wheels run true!*

Standardize on Taper-Lock. You save time and money and keep production rolling with these *interchangeable* bushings. See your Dodge Distributor, or write us for the full Taper-Lock story.

CALL THE TRANSMISSIONEER, your local Dodge Distributor. Factory trained by Dodge, he can give you valuable assistance on new, cost-saving methods. Look for his name under "Power Transmission Machinery" in your classified telephone directory, or write us.

THERE'S ONLY ONE TAPER-LOCK, THE BUSHING THAT MOUNTS FLUSH!

Standardize, economize with Taper-Lock, the bushing that is interchangeable in Dodge sheaves, sprockets, couplings and conveyor pulleys. *More than 2,000,000 in use!*

DODGE

of Mishawaka, Ind.

DODGE MANUFACTURING CORPORATION, 4400 UNION STREET, MISHAWAKA, INDIANA

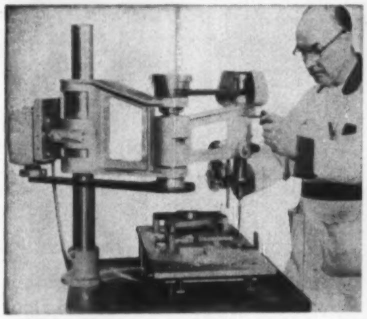
pieces can be uniformly processed.

Fewer heads are needed to process work; the number of passes needed to polish the work is greatly reduced; and positioning flexibility is excellent. *Write*: Murray-Way Corp., Box 180, Birmingham, Mich. *Phone*: Jordan 4-6890

Radial Drill Press

The jointed-arm drilling machine is easy to operate because the elbow and pedestal pivots are both equipped with combination radial and thrust bearings.

Double-belt drive and step pulleys provide six spindle speeds, from 620 to 12,000 rpm, with a 3600-rpm, ⅛-hp motor.



The maximum distance from the chuck nose to the base is 18 in.; the spindle travel is 2½-in.; and the radial range from spindle center to column is 24 in. *Write*: Hill Machine Co., 1301 Eddy Ave., Rockford, Ill. *Phone*: 7-5781

Bolt Trimmer

This fully automatic machine trims, reduces and rounds off ends of bolts, machine screws and other fasteners in a single operation. It also presses the heads of socket screws.

A horizontal crank press, it is built rigidly to eliminate elasticity in the frame.

Reduction of bolts, normally required for subsequent thread rolling, can be done simultaneously with the trimming, or it can be done as a separate operation.

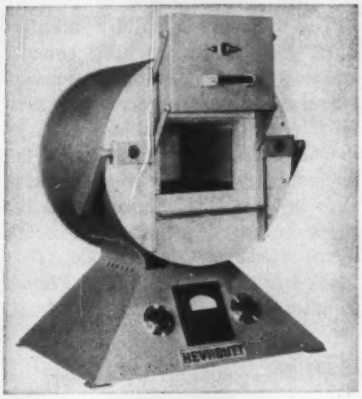
Flow lines of material in the bolt heads indicate high strength, and the quality is equal to bright turned screws.

Model AAG-III will reduce bolts up to 0.118-in. in diameter under the head. Model AAG-00 is for bolts up to 0.787-in. diam. *Write*: Haller Inc., 684 Ann Arbor Rd., Plymouth, Mich. *Phone*: 3074

Muffle Furnace

This large, automatic furnace operates continuously up to 1850° F.

Temperature indicating and control devices are in the pyramid-type base. Power input is controlled by a 36-step, tap-changing transformer.



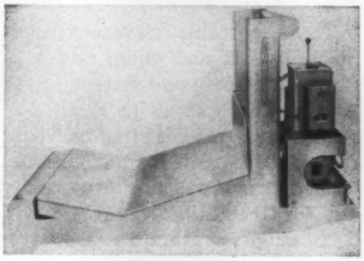
Additional insulation around the heating chamber gives rapid heating and improved efficiency.

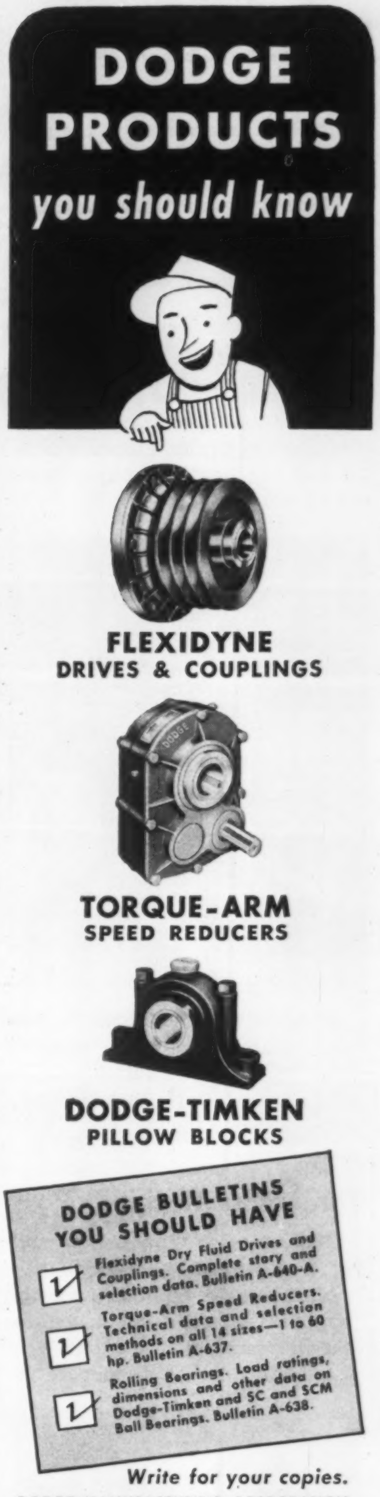
The heating chamber, inside dimensions 8 x 11 x 14 in., is formed by four heating units which can be arranged to expose the element or reversed to form a muffled chamber. *Write*: Hevi Duty Electric Co., Milwaukee 1, Wis. *Phone*: West 3-2756

Coil Lifters

Coils that weigh up to 4000 lb and have diameters up to 48 in. can be handled by the coil lifter. It has a V-shaped platform 41½ x 30 in. wide. Lowered height is 8 in.; the vertical lift is 18 in.

The lifter places coils on slitter mandrels and has ball bearing

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TORQUE-ARM SPEED REDUCERS

DODGE-TIMKEN PILLOW BLOCKS

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☑ Torque-Arm Speed Reducers. Technical data and selection methods on all 14 sizes—1 to 60 hp. Bulletin A-637.

☑ Rolling Bearings. Load ratings, dimensions and other data on Dodge-Timken and SC and SCM Ball Bearings. Bulletin A-638.

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DODGE MANUFACTURING CORPORATION
4400 Union Street • Mishawaka, Indiana

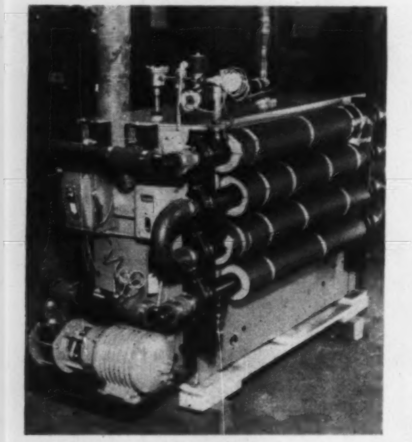
DODGE
of Mishawaka, Ind.

mounted flanged wheels, so that it can ride on tracks next to the slitter.

Either a manual hydraulic lift or an electrohydraulic lift is available. *Write*: Dept. R-34, Lewis-Shepard Products Inc., Watertown, Mass. *Phone*: Watertown 4-5400

Acid Cooling

This refrigeration unit cools sulphuric acid anodizing solution. The pump is Camac Furacam plastic and the heat exchanger tubes are of Karbate.

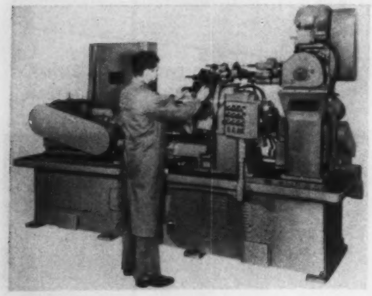


Controls hold solutions at any temperature. The units come in sizes to do any solution cooling job. *Write*: Carl Buck & Associates, Essex Falls, N. J.

Threading Machine

This indexing-type, hollow milling and threading machine uses two lead screw tapping units and one cam feed drill unit in a four-station operation.

A dual-loading, air-clamping fixture holds forged steel tierod sockets for the work cycle. Machine capacity is 430 parts an hour. *Write*: Hartford Special Machinery Co., 287 Homestead Ave., Hartford, Conn. *Phone*: Jackson 5-1401



Buffing Cleaner

A water-soluble liquid cleaner removes all types of buffing compounds from ferrous and nonferrous systems.

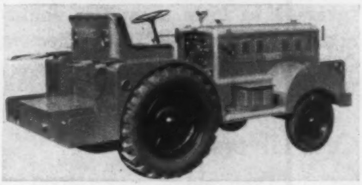
The cleaner is mildly alkaline (pH about 9 at working concentrations), but it is not a conventional alkaline cleaner. It is nontoxic and nonflammable.

The cleaner is mixed with 98-per-cent water. Working temperature is 170° F. The minimum immersion time is usually 3 minutes. *Write*: Cowles Chemical Co., 7016 Euclid Ave., Cleveland 3, O. *Phone*: Henderson 1-3400

Self-Propelled Welder

This welder has the engine directly coupled to the generator. Increased ground clearance at both axles adds to mobility.

It provides a mobile unit for installations in which welding is done at widely separated points. It can tow other equipment or material to the job as its draw-bar pull is 2000 lb.



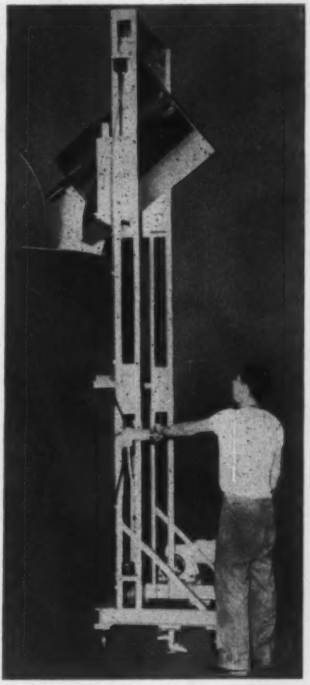
In addition to welding power, up to 1 kw (110 v, dc) auxiliary power can be supplied. *Write*: Hobart Bros. Co., Hobart Square, Troy, O. *Phone*: 2-1223

Skip Elevators

These portable elevators automatically lift and dump any free-flowing dry or liquid material from bags, drums, barrels or boxes.

Standard models handle loads from 250 to 1000 lb. An all-steel welded frame will not sway under any load condition.

A single, reversible electrical switch controls raising and lowering. After the skip is loaded, it rises to full elevation, tilts 45 degrees downward and stops in that position while the load is discharged.

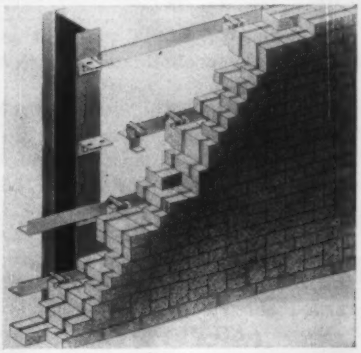


Reversing the switch straightens the skip and returns it to the floor for loading. *Write*: Frederick T. Apted Co., 314 Pamlico Ave., Uniondale, L. I., N. Y. *Phone*: Ivanhoe 9-6544

Suspended Wall

A modular wall for slab and billet heating furnaces and boilers, transfers the weight of refractories to a supporting metal framework. This raises the softening point of the refractories.

The refractories (except the sup-



Automotive Steering Knuckle Support forged from 1-15/16" Hot Rolled Round AISI Grade 1340

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MACHINABILITY

HEAT TREATING PROPERTIES

BALANCED TO CUT YOUR COSTS

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Forging Quality Steel Bars

Balance—the correct proportion of forgeability, machinability, and heat treating properties in forging steels—directly affects your profits. Balance of these properties reduces operating costs, and also produces higher-quality, finished forgings.

Careful metallurgical control of every process from ore mine to finishing mill at J&L assures the production of forging steels with the correct balance of properties you require.

Whether you produce rugged, heavy-duty forgings or lightweight, high-strength parts, J&L forging steels give the best results. Our staff of experienced metallurgists is available to help you establish the specifications to fit your need. Write or phone our nearest district office.

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J&L FORGING STEELS EXACTLY TO SPECIFICATION

porting tiles) are 2½ x 4½ x 9 in. They are locked together by tongues and grooves.

The modular wall can be insulated. It can be built within the steel casing and can be supported from existing buck stays with a minimum of structural change. New furnaces do not require steel casings.

The refractories are shaped so that they can be shipped on skids. *Write*: Geo. P. Reintjes Co., 2517 Jefferson St., Kansas City 8, Mo. *Phone*: Harrison 3570

Yard Crane

The 180 degrees of swing of this loader adds to the versatility of the rubber-tired crane.

Its 5000-lb capacity makes it especially valuable in handling heavy crates and parts; the fast, precise boom swing permits easy loading and unloading of freight cars and trucks.

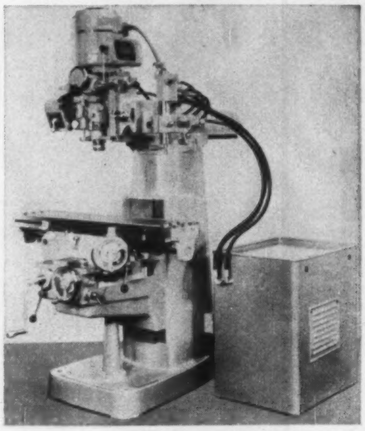
PETTIBONE
MULLIKEN

The crane comes in either two or four-wheel steering and two or four-wheel drive. *Write*: Pettibone Mulliken Corp., 4762 Division St., Chicago 51, Ill. *Phone*: Berkshire 7-3700

Tool and Die Milling

Here's a machine for the production of contoured shapes — plastic molds, diecasting dies, forging dies, master hobs and glass molds.

Among the helpful features are automatic hydraulic depth tracer, antifriction hand feed screws, front table hand control, a swivel mount for cutter head and tracer mechanism, swivel turret mount for a shaping attachment and a micrometer depth gage.



Eight spindle speeds range from 215 to 5650 rpm. *Write*: Cincinnati Milling Machine Co., Cincinnati 9, O. *Phone*: Redwood 2121

Punch Press

Here is a 2½-ton press for punching, shearing, forming, riveting, blanking, cutting and drawing. The half-press unit can be mounted on your own column and base.

The press will produce up to 300 operations a minute. The stroke is ¾-in. *Write*: Alva Allen Industries, Clinton, Mo. *Phone*: 1286

Eccentric Presses

A new line of top drive presses has capacities of from 400 to 4000 tons.

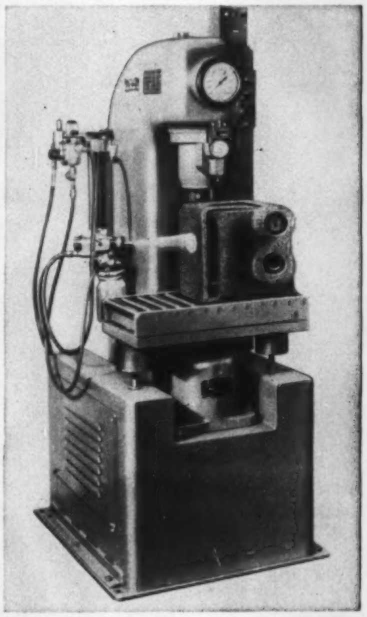
The pressure lubrication system uses troughs and gravity flow to keep all bearings lubricated, even if the pressure and flow switches should fail.

The low inertia air clutch is mechanically interlocked. Clutching and declutching are at speeds almost equal to the continuous speed of the press. The clutch can be inched at low torque when setting dies. *Write*: Hamilton Press Division, Baldwin - Lima - Hamilton Corp., Hamilton, O. *Phone*: 4-6511

Hardness Tester

This Brinell machine has a paint spray attachment that automatically indicates the relative hardness of parts.

Only parts within range are sprayed. Brinell limits on the machine can be set to the user's needs.



A roller section speeds testing. Parts are rolled into position under the tester; as the Brinelling cycle starts, the roller section drops down, leaving the part firmly seated on three hardened anvils. *Write*: Steel City Testing Machines Inc., 8817 Lyndon Ave., Detroit 38, Mich. *Phone*: Webster 3-3500

Free Machining Steel

A new, high-strength steel bar needs no heat treating. It has greatly improved machinability over the heat treated steel it replaces; it machines at least 25 per cent faster than annealed al-

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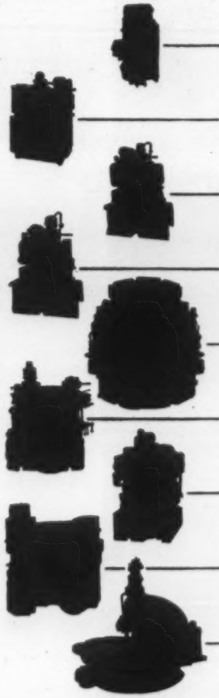
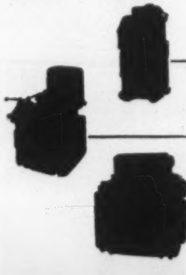


	SPUR AND HELICAL	EXTERNAL & INTERNAL	MAX. PITCH DIAMETER	MAX. DIAMETRAL PITCH	MAX. FACE WIDTH	MAX. STROKES PER MIN.
3" FINE-PITCH	both	yes	3 inches	40 steel, 30 brass	3/4" ext.	2000
No. 4GS	both	yes	6 inches	5/7 spur, 6 hel.	2"	635
7-TYPE*	both	yes	7" spur, 6 1/2" hel.	6 spur, 6/8 hel.	1 1/2" ext., 1" int.	450
7A-TYPE	both	yes	7" spur, 7" hel.	5/7 spur, 6 hel.	2" ext., 2" int.	450
No. 10 ROTARY	both	yes	12 inches	3/4 spur, 5/7 hel.	3" ext., 3" int.	500
6A-TYPE	both	yes	18 inches	3/4 spur, 5/7 hel.	5" ext., 3" int.	300
No. 12GS	both	yes	12 inches	3/4 spur, 5/7 hel.	4" ext., 4" int.	550
36-TYPE	both	yes	36 inches	3 spur, 4/5 hel.	6" ext., 6" int.	300
120-INCH	both	yes	120 inches	2 spur, 4 hel.	8" ext., 8" int.	148

*Max. P.D. internal—5 1/2"

SHAVING MACHINES



	SPUR AND HELICAL	EXTERNAL & INTERNAL	MAX. PITCH DIAMETER	MAX. DIAMETRAL PITCH	MAX. FACE WIDTH	MAX. SPREAD OF CENTERS
No. 4 FINE-PITCH	both	ext. only	4 inches	20	1 inch	12 inches
No. 8 "FULL-TOOL"	both	yes	8 inches	4	2 1/2 inches	**
No. 11 INTERNAL	both	int. only	***	6	1 1/2" up to 10p; 1", 12 to 16p	***

Also 12", 18" and 24" machines for externals only.

**Depends upon work-holding fixture

***Depends upon design of gear

INSPECTION INSTRUMENTS

		SPUR AND HELICAL	EXTERNAL & INTERNAL	MAX. PITCH DIAMETER
FOR COMPOSITE CHECK	No. 4 FINE-PITCH RED LINER	both	yes	4 inches
	No. 8M RED LINER	both	yes	***
	No. 20M RED LINER	both	yes	18 inches
INVOLUTE PROFILE CHECK	No. 12M INVOLUTE MEASURING	both	yes	12 inches
CHECKING LEAD CROWN & TAPER	No. 12H LEAD MEASURING	both	yes	12 inches

Nos. 24M Involute and 24H Lead Measuring Instruments with capacity of 24 inches

***Depends upon design of gear

In addition to the machines listed above, Fellows builds special-purpose equipment for production of gears and related items. Descriptive literature, as well as specific technical data and price information, will be gladly supplied by your Fellows Representative. WRITE, WIRE or PHONE any Fellows Office!

THE FELLOWS GEAR SHAPER COMPANY, 78 River Street, Springfield, Vermont
Branch Offices: 319 Fisher Building, Detroit 2 • 5835 West North Avenue, Chicago 39
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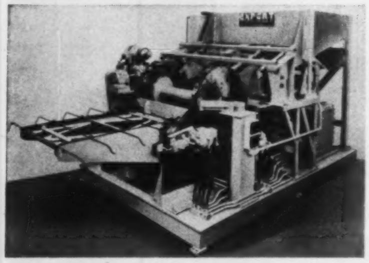
loys and 50 to 100 per cent faster than the heat treated alloys.

Distortion is held to a minimum; surface finish is excellent. Tensile strength is 140,000 to 150,000 psi. Hardness is about 30 Rc. *Write*: La Salle Steel Co., Hammond, Ind. *Phone*: Westmore 2-6090

Bending Machine

This automatic machine makes up to two bends in each end of steel rods at rates up to 960 rods an hour.

A mechanically operated, rotary index drum brings rods from a feed chute to two bending stations. Inner and outer bends are produced in each rod end by bending dies powered by single-rotation, hydraulic, rotary actuators.



A roller-chain conveyor carries the finished rods out of the machine.

The machine takes 6 x 8 ft of floor space. A 1-hp motor powers the drum index. A compact hydraulic power unit, using a 7½-hp motor, powers the rotary actuators and slide control cylinders. *Write*: Expert Automation Machine Co., 17144 Mt. Elliott Ave., Detroit 12, Mich. *Phone*: Twinbrook 1-4327

Low Hydrogen Electrode

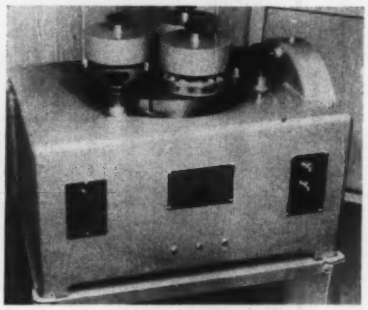
The use of iron powder in the coating enables the electrode to be used for arc welding in all positions. It deposits more metal; the bead is smooth and uniform; and welds are of x-ray quality.

The powdered iron improves the stability of the arc and minimizes shorting out; the necessity of holding definite arc lengths is eliminated. Porosity from restarting the arc is eliminated by the iron powder.

Welding is faster, and higher welding currents, with alternating or direct current, can be used. *Write*: Hobart Bros. Co., Hobart Square, Troy, O. *Phone*: 2-1223

Tool Lapper

Carbide tool inserts are completely ground by this semiautomatic machine.



It uses domestic abrasives in a fast, accurate grinding operation that uses a minimum of labor and materials.

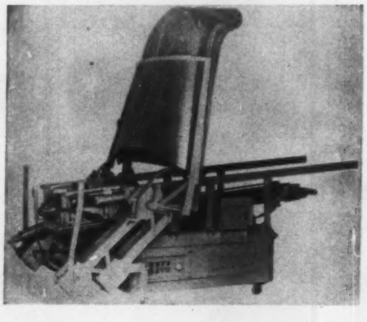
Tool holders are available for all standard triangular, round and square inserts or throwaways. *Write*: Empire Corp., 1566 S. 83rd St., Milwaukee 14, Wis. *Phone*: Spring 4-6200

Chemical Dip

This dip is the answer to "spotting out" troubles on thin copper and brass plate. It prevents tarnishing and eliminates finger-printing in assembly operations. It improves adhesion, provides leveling action and saves lacquer. *Write*: Chemical Corp., Springfield, Mass. *Phone*: Republic 9-5601

Press Feeder

Here is a new unit which receives a stamped panel, turns it over, then automatically feeds it into the trimming die.



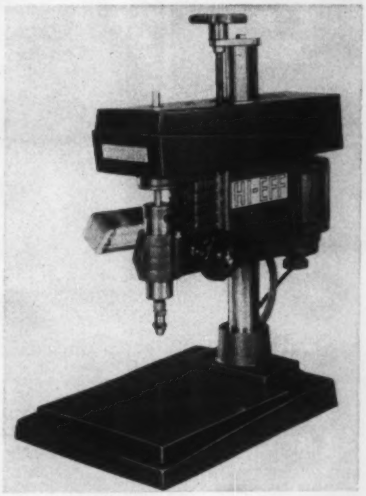
The unit is mounted on steel casters, so that it can be moved from press to press. It has an 84-in. feed stroke.

No special electrical installation is needed—110-volt current is used. All controls are on one side of the machine. *Write*: Hamilton Automation Inc., Hamilton, O. *Phone*: 2-4581

Drilling Machine

Here is a precision drilling machine for production work.

Combined runout of spindle and chuck is 0.0005 in., or less. Spindle speeds range from 800 to 10,000 rpm.



Holes from 0.001 to ⅛-in. can be drilled. *Write*: Taylor Dynamometer & Machine Co., 6411 River Parkway, Wauwatosa 13, Wis. *Phone*: Bluemound 8-9815

Induction Heaters

Electronic heaters do brazing, soldering, surface hardening and annealing. Output ratings of a new line go from 7½ to 40 kw.

Combinations of thyratron power control, built-in output transformer or tapped-tank coil can be had with any heater. The heaters have dustproof cabinets and separate aluminum enclosures for oscillator units.

A constant-voltage transformer regulates filament voltage to give longer tube life. *Write*: Industrial Heating Dept., General Electric Co., Schenectady 5, N. Y. *Phone*: 4-2211

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Continuous Billet and Sheet-Bar Mills • Continuous Merchant and Wire-Rod Mills • Continuous Strip Mills • Skelp Mills • Two-High and Three-High Blooming Mills • Hot and Cold Mills for Non-Ferrous Metals • High-Speed Cold Rolling Strip and Sheet Mills • High-Speed Foil Mills • Special Mills

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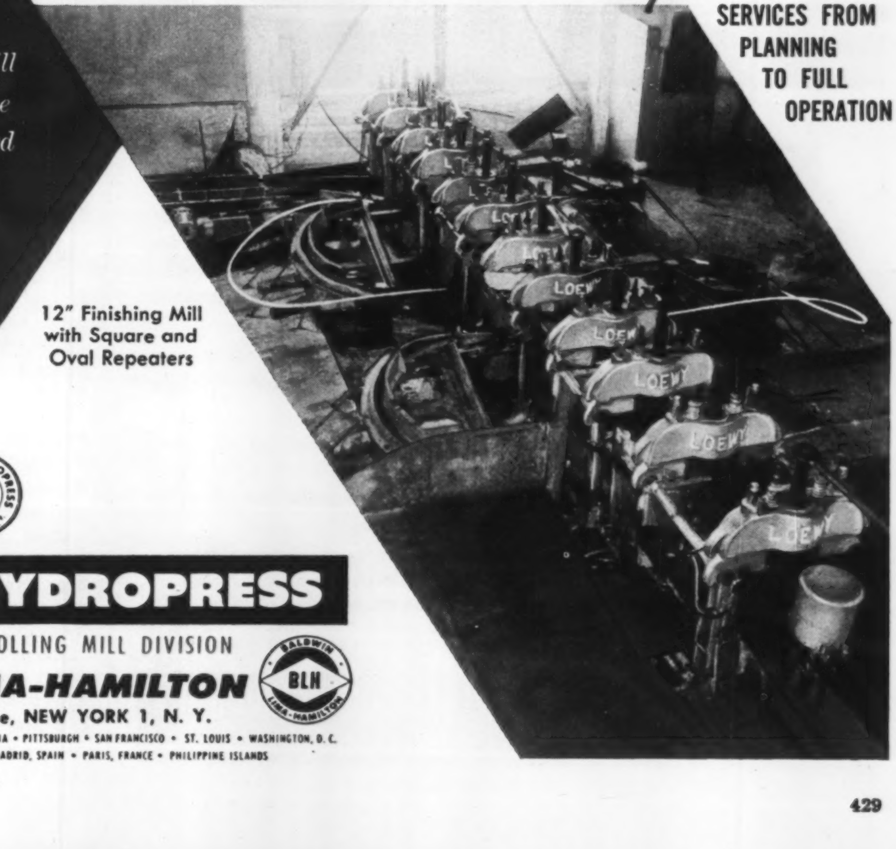
Parts of a Modern Bar- and Merchant Mill Plant built for the National Shipyard and Steel Corporation, Manila, Philippines.



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NEW Literature

Write directly to the company for a copy

Aluminum Alloys

An illustrated booklet tells how to melt and cast aluminum alloys. Metallurgical Dept., George Sall Metals Co. Inc., 2300 E. Butler St., Philadelphia 37, Pa.

Jet Blades

Precision machining of jet engine compressor and turbine blades and the machines that do the work are described—bulletin 50620-A, 6 pages. Ex-Cell-O Corp., 1200 Oakman Blvd., Detroit 32, Mich.

Molding Sands

A series of 12 bulletins gives data on foundry molding sands. Illinois Clay Products Co., 208 S. La Salle St., Chicago 4, Ill.

Die Steel

A data sheet describes a free machining, air hardening steel. Sales Dept., Allegheny Ludlum Steel Corp., 2020 Oliver Bldg., Pittsburgh 22, Pa.

Double Spindle Grinder

A precision disc grinder for flat surface grinding is described—bulletin 2H30, 16 pages. Gardner Machine Co., Beloit, Wis.

Aluminum Forgings

Minimum mechanical properties of hand forgings are listed in a 6-page folder. Industrial Service Division, PR 355, Kaiser Aluminum & Chemical Corp., 1924 Broadway, Oakland 12, Calif.

Potentiometers

Design and use of potentiometers are covered. Graphs and charts give physical and electrical design characteristics—16-pages. Borg Equipment Division, George W. Borg Corp., Janesville, Wis.

LP Gas

An 8-page bulletin tells the history, characteristics and uses of liquefied petroleum gas. Gulf Oil Corp., Pittsburgh, Pa.

Nickel-Tin Bronzes

Bronzes for constructional, bearing and pressure castings are described—28 pages. Reader Service Section, International Nickel Co. Inc., New York 5, N. Y.

Industrial Cars and Tracks

Representative custom-designed industrial cars for steel plants, raw materials handling and specialized rail transportation are described in a 32-page booklet. Descriptions of crossings, frogs, switches and other trackwork accessories are included, along with mathematical, trigonometric and conversion tables—134 pages. U. S. Steel Corp., 525 William Penn Place, Pittsburgh 30, Pa.

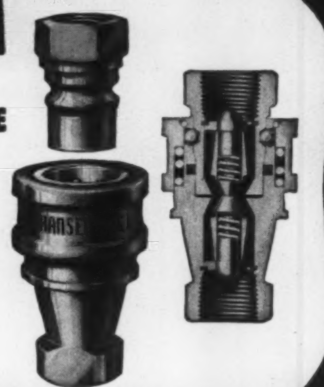
Polyvinyl-Chloride Pipe

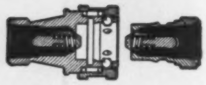
A thermoplastic pipe for conveying highly corrosive, moderate-temperature liquids is described—bulletin PE-40, 12 pages. Plant Equipment Sales, Corning Glass Works, Corning, N. Y.

Presses

Metalworking machines for drawing and forming, straightening, forcing, bending and reducing are described in a 24-page bulletin, 1010-C. Hydraulic C-frame presses for forcing, straightening, bending, forming and similar operations are illustrated in bulletin 1015.

Illustrated bulletin 1036-B covers small, hydraulic production presses. Elmes Engineering Division, American Steel Foundries, 1150 Tennessee Ave., Cincinnati 29, O.





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SHUT-OFF

COUPLINGS!

QUICK CONNECTION AND DISCONNECTION

INSTANT AUTOMATIC FLOW OR SHUT-OFF

Seals Both Ends of Line
AUTOMATICALLY
INSTANTANEOUSLY

To connect a Hansen Two-Way Shut-Off Coupling, you just pull back the sleeve and push the Plug into the Socket. To disconnect, merely pull back sleeve. No tools required. Similar valves in Socket and Plug shut off both ends of line when Coupling is disconnected—practically eliminate spilling of liquid or escape of gas at instant of disconnection.

Quick Connective Fluid Line Couplings for
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ACETYLENE • GASOLINE
WATER • COOLANTS

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HOSE CLAMP PLUGS
HOSE CLAMP SOCKETS
HOSE CLAMP COUPLINGS

FEMALE PIPE THREAD CONNECTIONS FROM 1/8" TO 1"

Hansen Series HK Two-Way Shut-Off Couplings are available with female pipe thread connections from 1/8" to 1" inclusive. Available in brass or steel.

Also Straight-Through and One-Way Shut-Off Couplings. Write for Catalog.

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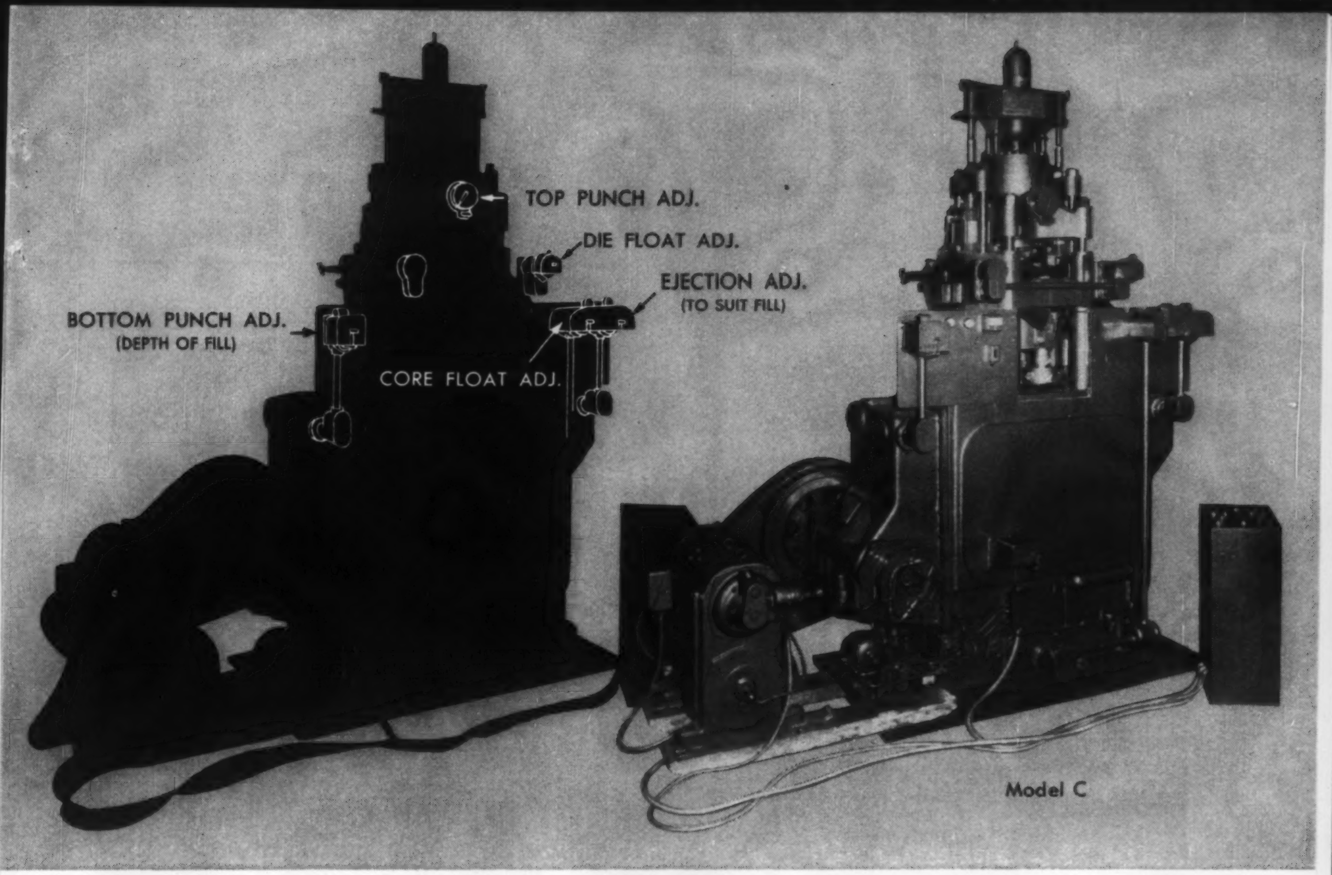


INDIVIDUALIZED COMPONENTS of new Baldwin powdered metal presses make adjustments easy

It's mighty easy to make adjustments in density or weight in Baldwin's new Model "L" and "C" presses. That's just one of the results of a new concept of compacting powdered metals.

These revolutionary new Baldwin presses are not just remodeled heavy-duty pill presses. They have been designed expressly to meet your end product's needs. For example, instead of having combinations of actions, press components have been individualized. That enables you to make adjustments easily to fit any job.

Since there are no cams to change, many of the adjustments can be made while the presses are in operation. Also all controls are concentrated on one panel for easy supervision and adjustment. Two separate controls adjust the depth of fill and the stroke of the bottom punch. The relative position of the core rod to the die is also adjustable to aid in controlling the fill when making counterbored parts.

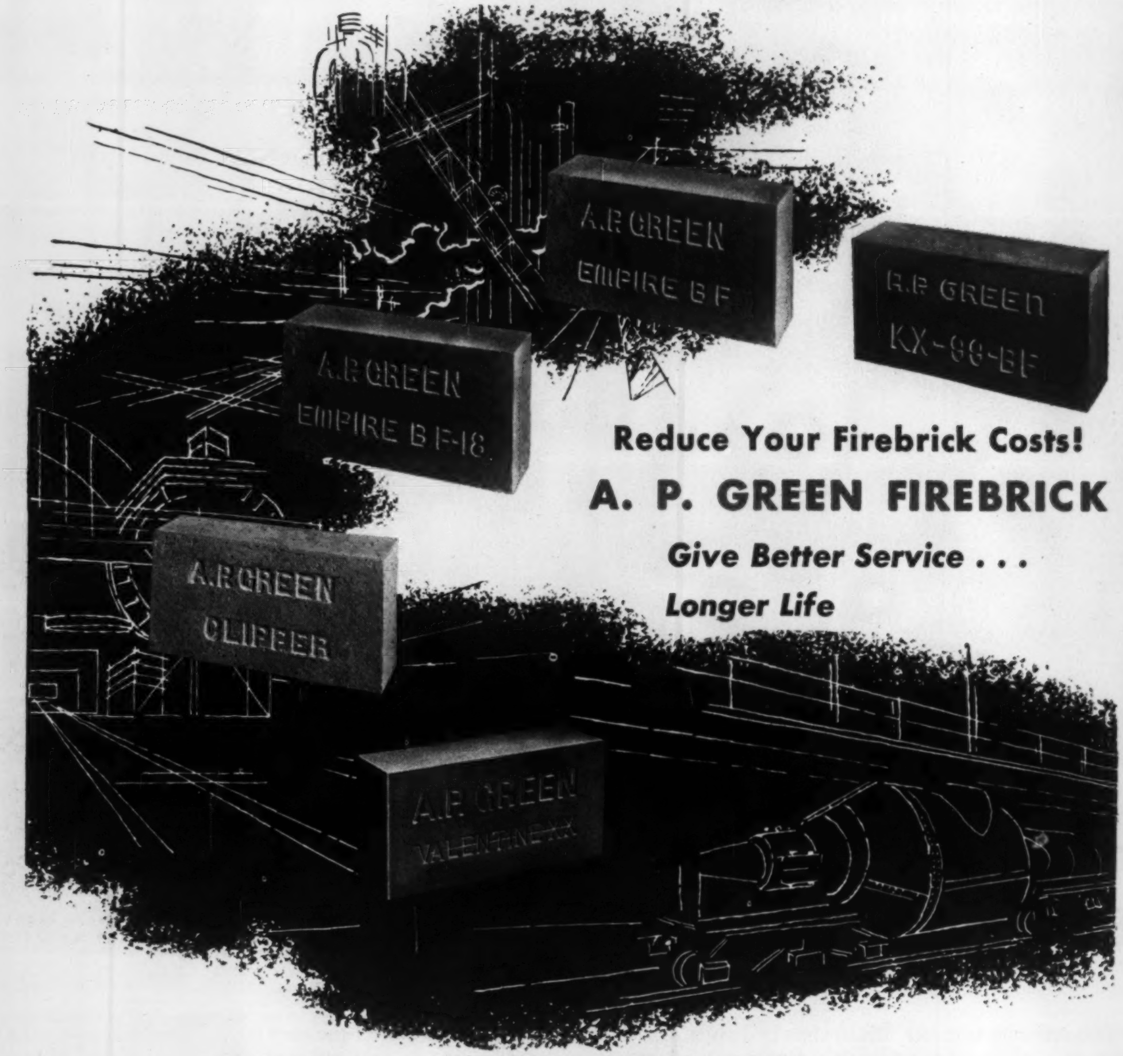
Further evidence of Baldwin's new concept includes such unique powder metal press features as . . . hydraulic heads, shuttle type feeders, independently floating die and core rod, automatic lubrication and variable cycling. It's no wonder that initial tests prove that these new Baldwin presses can out-produce competitive models by 200%, turn out compacts to closer tolerances and eliminate costly grinding operations.

You'll find more information and specifications on these new presses in our Bulletins 3101 (C) and 3104 (L). Write Dept. 4846, Baldwin-Lima-Hamilton Corporation, Philadelphia 42, Pennsylvania.

BALDWIN BLH LIMA-HAMILTON

Eddystone Division

BALDWIN-LIMA-HAMILTON


A.P. GREEN
EMPIRE B F
A.P. GREEN
KX-99-BF
A.P. GREEN
EMPIRE B F-18
A.P. GREEN
CLIPPER
A.P. GREEN
VALENTINE XX

Reduce Your Firebrick Costs!

A. P. GREEN FIREBRICK

Give Better Service . . .
Longer Life

IN THE STEEL INDUSTRY

- **Open Hearth Checkers**
- **Hot Metal Mixers**
- **Soaking Pits**
- **Blast Furnaces and Stoves**
- **Hot Metal Transfer Cars**
- **Slab Heating and Other Types of Steel Plant Furnaces**

A. P. Green Brick for the Steel Industry include—KX-99, KX-99-BF, EMPIRE BF, EMPIRE BF-18, EMPIRE D.P., EMPIRE S.M., VALENTINE XX, 80 ALUMINA, KRUZITE, MIZZOU, MEX-KO, CLIPPER D.P., CLIPPER S.M., and TEXAMO.

Other Products—a complete line of Castables, Mortars, and Plastics.

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REFRACTORY PRODUCTS

A. P. GREEN FIRE BRICK COMPANY
MEXICO, MISSOURI, U. S. A.
PLANTS: Mexico, Mo. • Woodbridge, N. J. • Sulphur Springs, Texas
In Canada: A. P. Green Fire Brick Company, Ltd., Toronto 15, Ontario

an important weapon in
America's arsenal

THE WORLD'S LARGEST STEAM DROP HAMMER

Under a contract with the United States Government, Erie Foundry Company has recently delivered the eighth 50,000 lb. Steam Drop Hammer, the largest ever built.

Here are some of this all-steel hammer's dimensions:

Weight: 1,650,000 lbs.
Height, overall: 45 ft.
Height, floor line to top: 28½ ft.

The hammer was completely machined and assembled for factory pre-testing (a standard Erie Foundry Company procedure on all machines) in Erie Foundry's plant—a modern factory which is equipped with new giant machine tools to handle such large work.

Of special interest to hammermen is the 25 to 1 anvil ratio. The added anvil weight more fully utilizes this hammer's tremendous impact energy of 850,000 foot pounds. Like all Erie hammers, all stressed parts on the 50,000 lb. machine are *steel.*

With eight 50,000 lb. Erie Steam Drop Hammers in service and stand-by, our country is ready to forge the larger component forgings needed in the weapons of today and tomorrow.

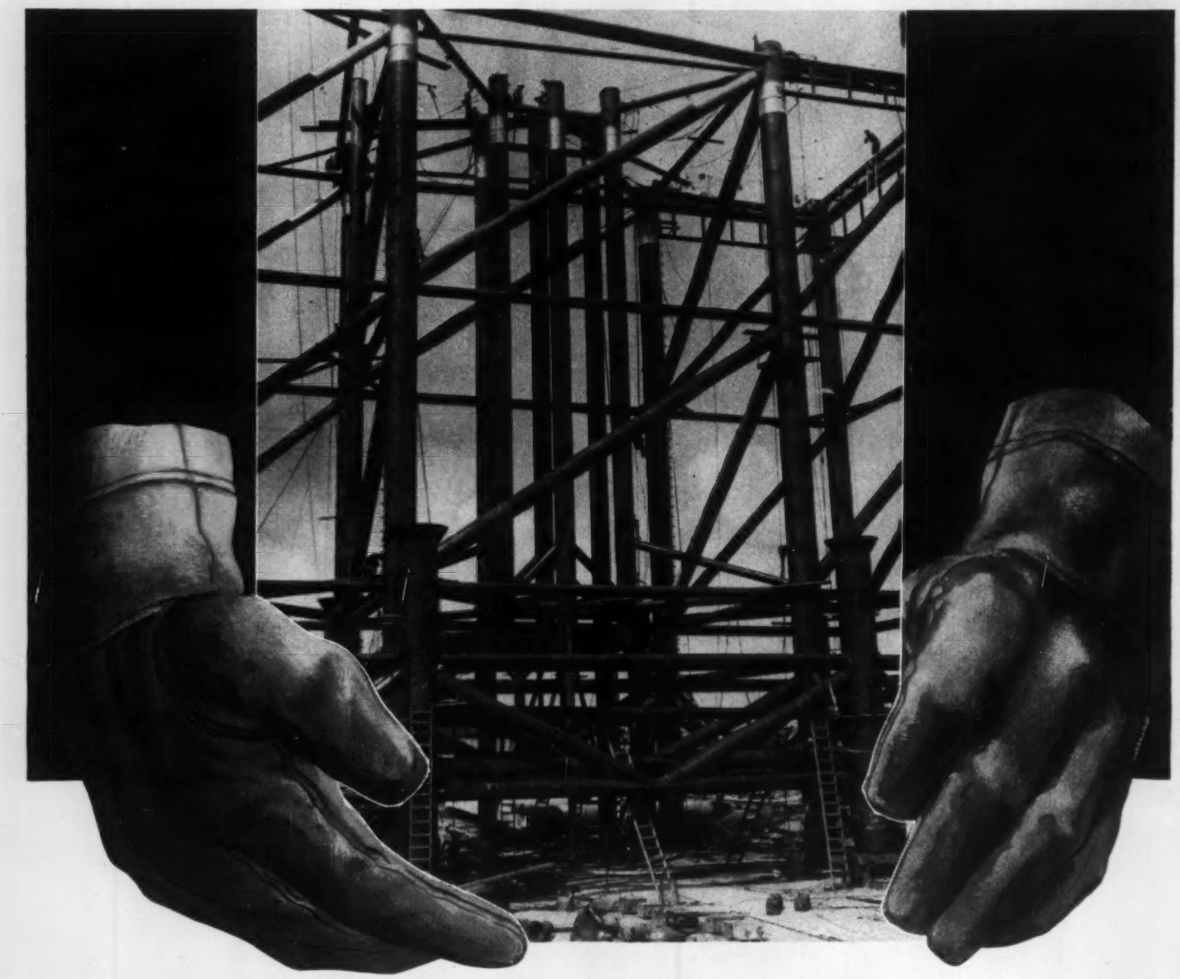
the greatest name in forging hammers

ERIE

in our 61st year

WRITE FOR BULLETIN 355

ERIE FOUNDRY CO. ERIE, PA.



steel fabrication . . . by the forces of AVONDALE

If there is one industrial service for which Avondale is world-famous, it is steel fabrication. Avondale knows how to handle steel, skillfully and with great speed. Avondale has pioneered in the use of steel to serve the needs of many industries—in offshore oil operations, marine, chemical and construction fields. Avondale's products of steel are of outstanding quality, carefully engineered and masterfully fabricated. These products include steel ships, towboats, tugboats, barges, offshore drilling rigs, platforms, pipe jackets, porcelain enamel on steel service stations . . . and many more.

SHIP BUILDING · SHIP REPAIRING · FOUNDERS · PROPELLERS · STRUCTURAL STEEL

STEEL

AVONDALE MARINE WAYS, INC. CABLE ADDRESS "AVONWAYS"

P.O. BOX 1030 • PHONE UNiversity 6-4561 • NEW ORLEANS 8, U.S.A.

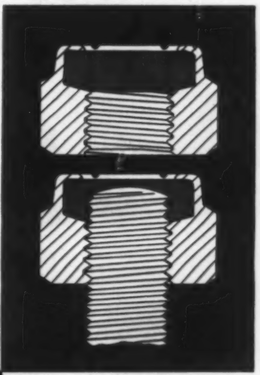
What's special about this STOP NUT?

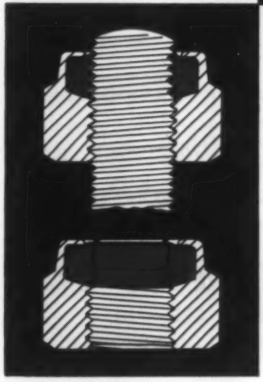
Several things make this nut unusual. For instance, you can "stop" it at any position on the threaded length of the bolt . . . or wrench it tight against the work where it protects bolt threads against corrosion and prevents liquid leakage. No matter where you leave it on the bolt, it will remain tight in that exact position, even though you subject it to heavy vibration and shock loads. But use a wrench on it and it comes off as easily as it went on. The red locking collar is nondestructive—does not gall bolt threads or remove plating. You can remove it and re-use it again and again.

What gives it its grip?

1 The locking collar is unthreaded and elastic. It has an inside diameter smaller than the major diameter of standard bolts.

2 The bolt impresses a mating thread into the collar and the resulting compressive forces exert a constant friction grip on the bolt. . . .





3 and exert a downward thrust bringing the lower flanks of the bolt thread into firm metal to metal contact with the matching nut threads, eliminating normal axial play.

4 Nut is removable and reusable . . . the Red Elastic Collar retains its grip after repeated usage.

Will it hold under ALL conditions?

The locking principle of the Elastic Stop® nut has been tested and proved by over 25 years of actual field service. Elastic Stop nuts are used on locomotives . . . and pile drivers. They fasten hedge shears and harvesters, drilling rigs and washing machines, trucks and roller skates. And no Elastic Stop nut customer has ever stopped using them because of unsatisfactory performance.

What about sizes and materials?

Elastic Stop nuts are available from a watchmaker's 0-80 all the way to 4"—in materials that include stainless steel, brass, aluminum and other alloys. Protect your product with "fastener insurance." Try Elastic Stop nuts on trouble spots, whether to protect expensive heavy equipment from costly downtime or to guarantee the accuracy of delicate electrical equipment by maintaining precision adjustments. We'll supply free test samples.

ESNA® TRADE MARK

ELASTIC STOP NUT
CORPORATION OF AMERICA
Dept. N82-160, 2330 Vauxhall Road, Union, N. J.

Please send the following free fastening information:

☐ ELASTIC STOP nut bulletin

☐ Here is a drawing of our product. What self-locking fastener would you suggest?

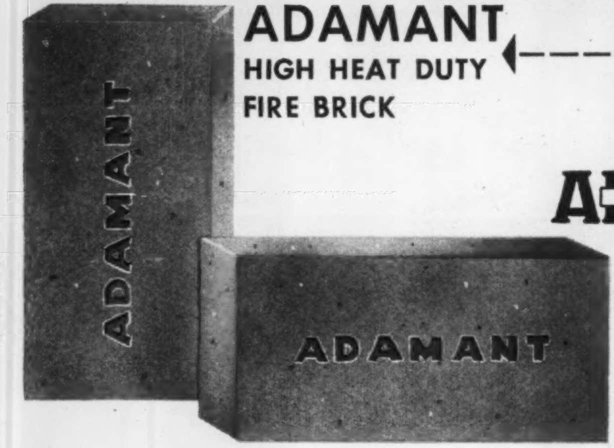
Name____________________ Title________

Firm____________________________

Street___________________________

City______________ Zone____ State______

THIS COMBINATION MEANS LONGER FURNACE LIFE



ADAMANT
HIGH HEAT DUTY
FIRE BRICK

ADAMANT FIRE BRICK CEMENT®

BOTFIELD REFRACTORIES COMPANY
ADAMANT
FIRE BRICK CEMENT
PHILADELPHIA, PA.
500 LBS NET

ADAMANT High Duty Brick—exceptional quality, manufactured under exacting control methods . . . Dry Pressed for density and Tunnel Kiln burned for uniformity of shape and hardness. Meets the A.S.T.M. specification for High Duty Brick.

ADAMANT Cement—unusually high bonding strength at room temperature, which increases as temperature rises . . . this greater bonding strength protects the structure at the joints, where failure usually begins . . . therefore, linings last longer; production is maintained; repair costs and production materials are saved; and, there is less "outage." (100, 250 and 500 lb. air-tight drums).

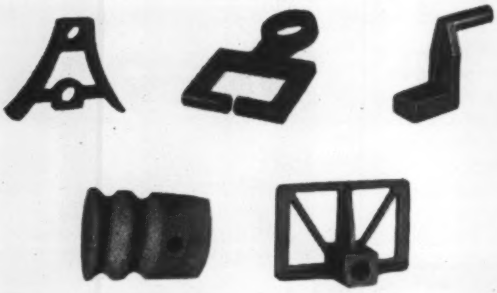
SUPER ADAPATCH

. . . a plastic refractory material highly suitable for constructing monolithic forge furnace linings, boiler furnace walls, pit furnaces, etc. SUPER ADAPATCH meets the demand for an easily handled, economical material.

ADACAST

. . . as shown above, ADACAST enables you to form your own flat, suspended rear arch in H.R.T. boilers . . . with the aid of the newly designed, BOTFIELD Multi-purpose Anchors (described at right).

new design BOTFIELD MULTI-PURPOSE HANGERS



With the above, illustrated anchors all that may be required is lengths of 1½" O.D. pipe for hanging the roof tile . . . or as spacers behind the wall clip for 13½" and 18" walls.

Write for literature . . . and the name and address of your nearest BOTFIELD Industrial Distributor.

BOTFIELD
REFRACTORIES CO.
SWANSON & CLYMER STS.
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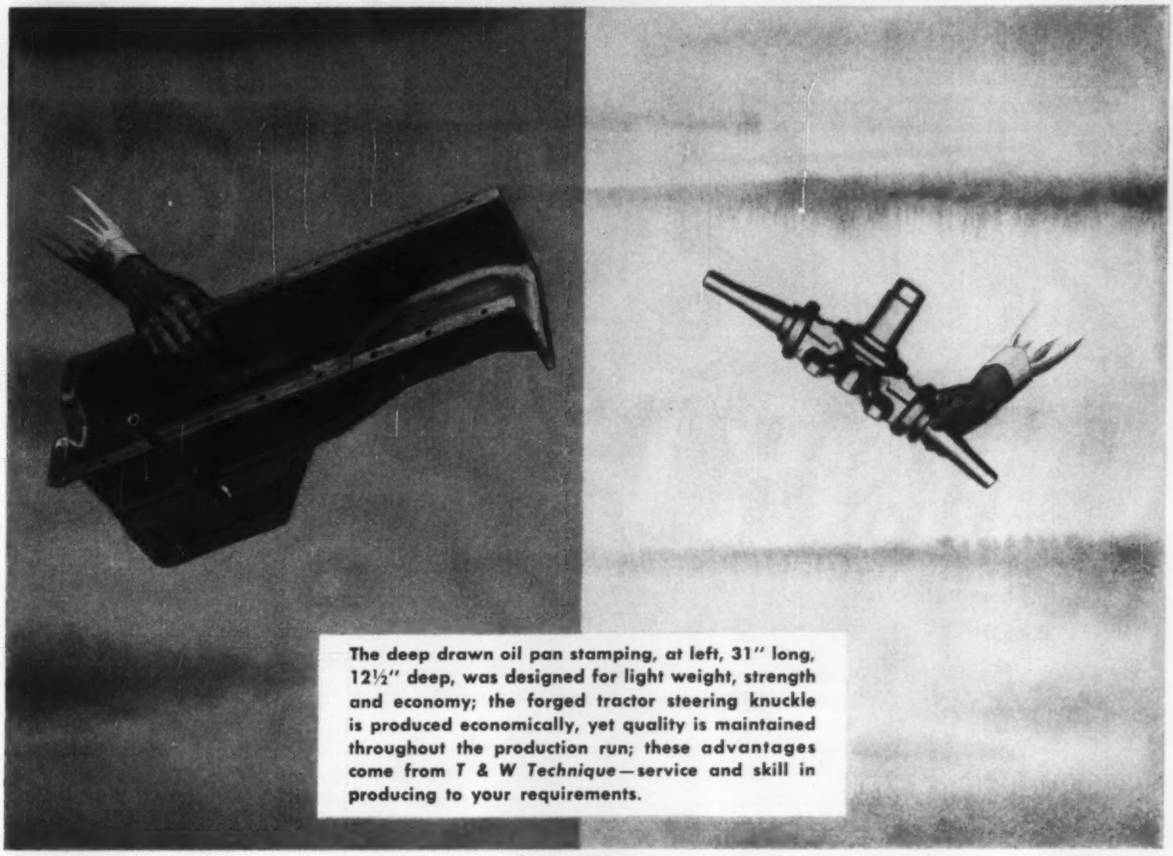

The deep drawn oil pan stamping, at left, 31" long, 12½" deep, was designed for light weight, strength and economy; the forged tractor steering knuckle is produced economically, yet quality is maintained throughout the production run; these advantages come from T & W *Technique*—service and skill in producing to your requirements.

For Stampings, or Forgings, T&W TECHNIQUE produces savings

Many who buy stampings, or forgings, have discovered how *T & W Technique* helps them save time, avoid trouble, save dollars. *T & W Technique* is the special skill and service T & W offers you. It is effective design and engineering service, plus skill which permits making of hard-to-produce parts without delay, plus quality control, and capacity to deliver on schedule. For both stampings and forgings, *T & W Technique*, the know-how from over 50 years of experience, delivers you parts that cost you less at the point of assembly.

STAMPINGS
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FORGINGS

TRANSUE & WILLIAMS
Over 50 years of experience

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Please let me know what "T & W Technique" can do for us. We are interested in
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City ____________ Zone ____ State ____________

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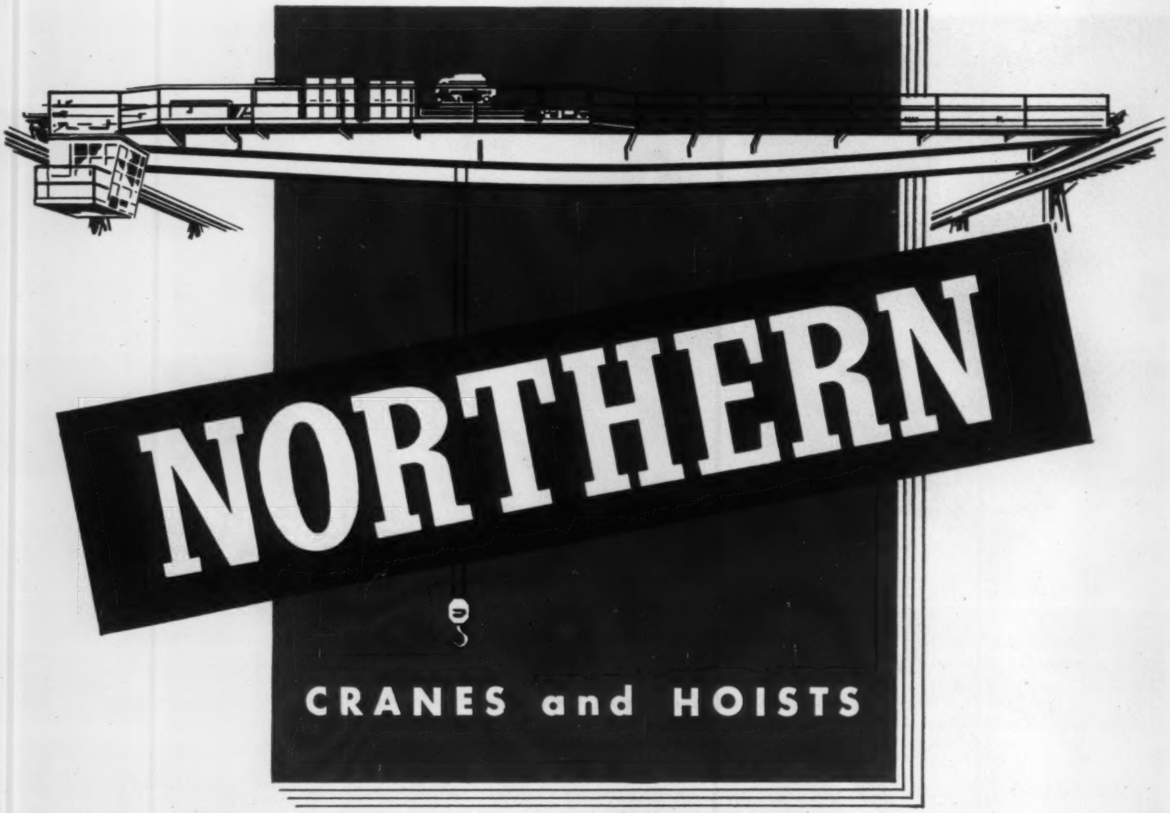
T & W DEEP DRAWN STAMPINGS AND FORGINGS USUALLY COST LESS AT THE POINT OF ASSEMBLY



Look Overhead...
See "NORTHERN"

"NORTHERN" — the name you see on overhead electric cranes in industrial plants of all kinds wherever you may be, because NORTHERN — since 1899 — has been a leader in industrial crane design and construction.

The name "NORTHERN" represents faithful adherence to uncompromising design, quality controlled machining, and closely inspected fabrication. "NORTHERN" Cranes and Hoists have an extra margin of safety — give dependable, fast service under the most rugged, emergency conditions — are notable for fine, standard-type electrical equipment and controls for precise manipulation and quick, easy maintenance with minimum downtime.

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NORTHERN ENGINEERING WORKS

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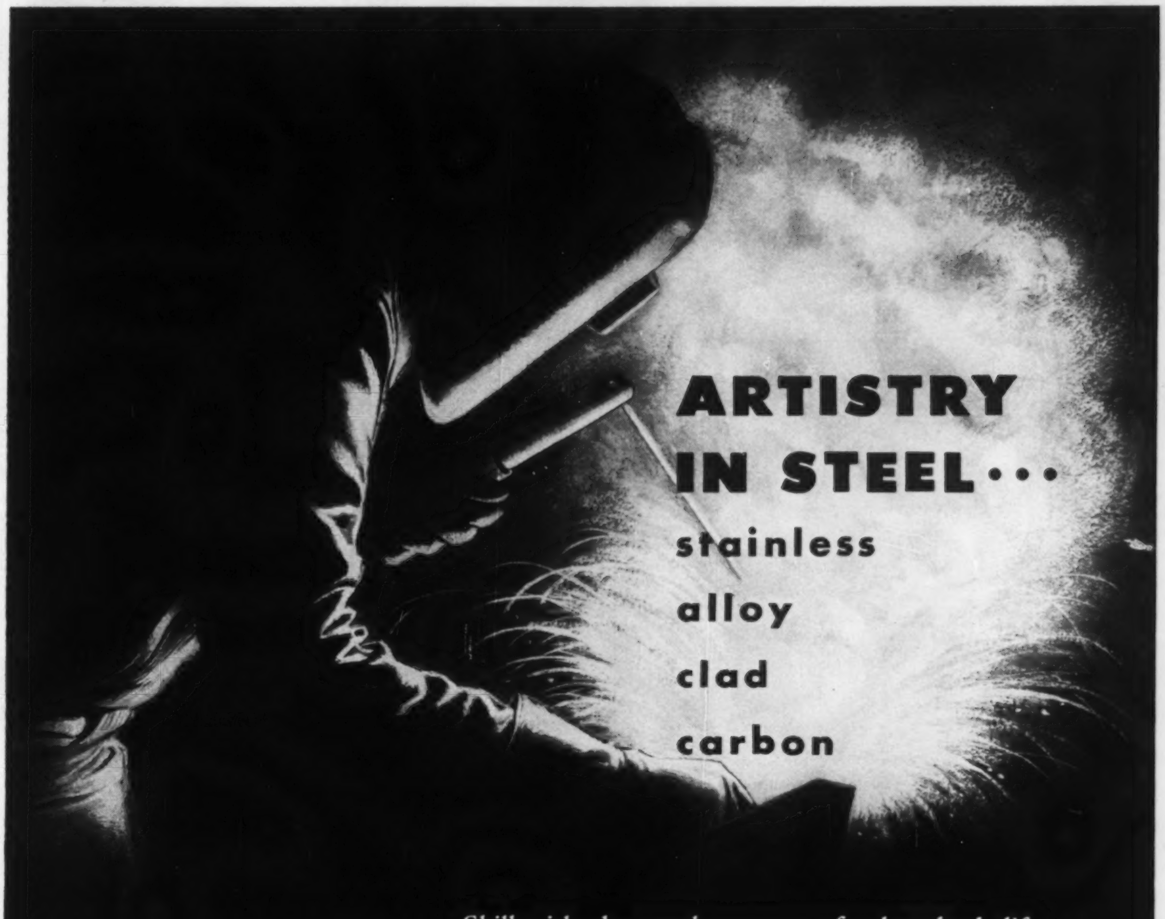
OVER 50 YEARS BUILDERS OF MATERIAL HANDLING EQUIPMENT



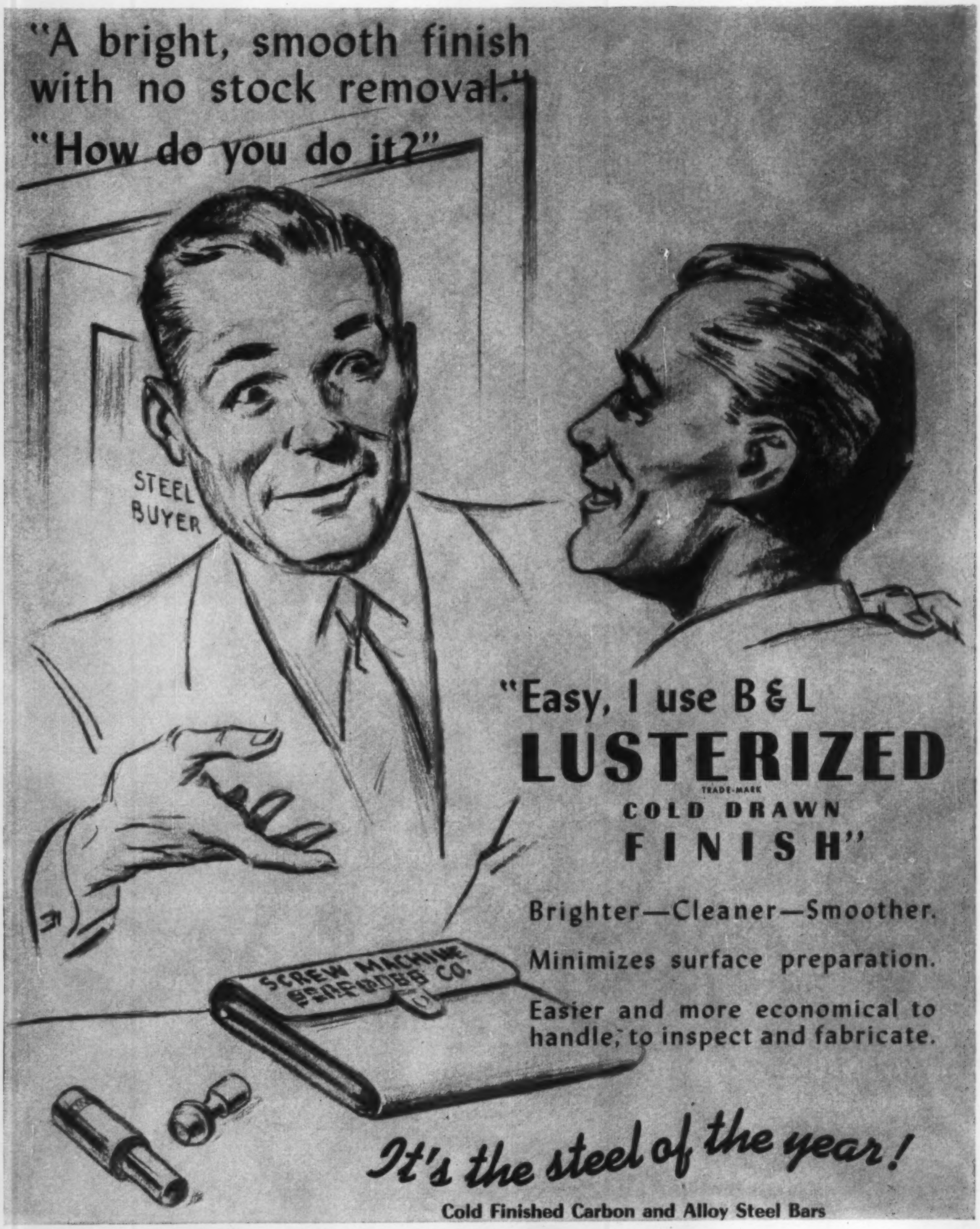
ARTISTRY IN STEEL...

stainless
alloy
clad
carbon

oil refining and chemical plant equipment—
fractionating towers,
pressure vessels—
plate work—
special machinery—
heavy industrial equipment—
stainless steel

Skill with the torch, or any of a hundred different tools of the trade—in steel fabrications, massive or small—is fairly obvious in the quality of the finished product. The extra touch of Sun Ship's professional skill—acquired through years of countless difficult jobs—adds artistry ...which is evident in product performances and dependability beyond the demands of industry.

Sun
SHIPBUILDING & DRY DOCK COMPANY
SINCE 1916
ON THE DELAWARE • CHESTER, PA.
25 BROADWAY • NEW YORK CITY


"A bright, smooth finish with no stock removal."
"How do you do it?"
STEEL BUYER
"Easy, I use B&L LUSTERIZED TRADE-MARK COLD DRAWN FINISH"
SCREW MACHINE PRODUCTS CO.

Brighter—Cleaner—Smoother.

Minimizes surface preparation.

Easier and more economical to handle, to inspect and fabricate.

It's the steel of the year!

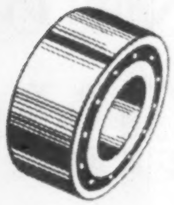
Cold Finished Carbon and Alloy Steel Bars

BLISS & LAUGHLIN, INC.

GENERAL OFFICES: HARVEY, ILLINOIS

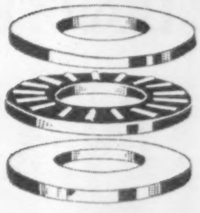
SALES OFFICES
IN ALL PRINCIPAL CITIES

FOUR PLANTS:— HARVEY, ILL. DETROIT, MICH. BUFFALO, N. Y. MANSFIELD, MASS.



1918

First solid cylindrical roller bearings for steel mill motors



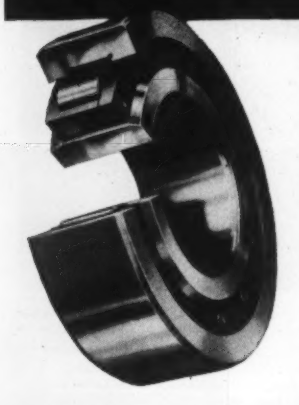
1925

First solid cylindrical roller thrust bearings for crane hooks

solid cylindrical roller bearings

for every type of steel mill operation . . .

FOR HEAVY DUTY

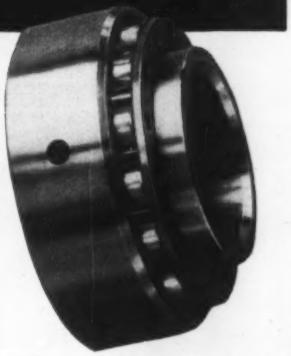


Radial Type, Bronze Retainer

Thrust Type, Bronze Retainer

For Dependable Performance at Moderate Cost

TRU-ROL, Segmented steel retainer



Metric Series, steel cage—Trunnion-End Rollers

● Continuing its early pioneering, Rollway has developed various types and sizes of roller bearings for roll necks, shears, lorry cars, screw-downs, skelp mills, runout tables, charging buggies and ladle cranes. Standard Rollway bearings have been especially serviceable in bridge wheels, trolley wheels and ingot cars.

Along with its bearing development, Rollway's engineering service has greatly increased in efficiency. This no-cost, no-obligation service is available at all times through your nearest engineering office or authorized Rollway distributor.

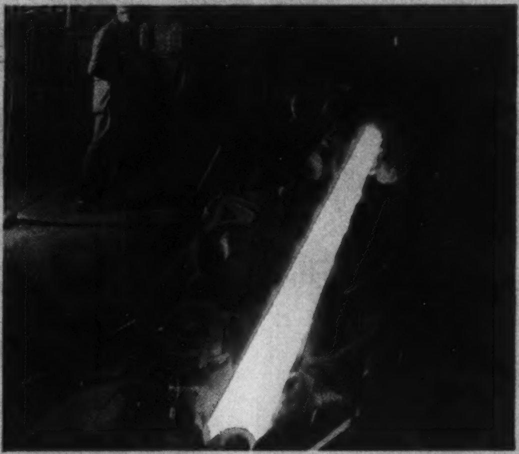
ROLLWAY BEARING CO., Inc.
545 Seymour Street, Syracuse, N. Y.

ROLLWAY
BEARINGS
COMPLETE LINE OF RADIAL AND THRUST CYLINDRICAL ROLLER BEARINGS

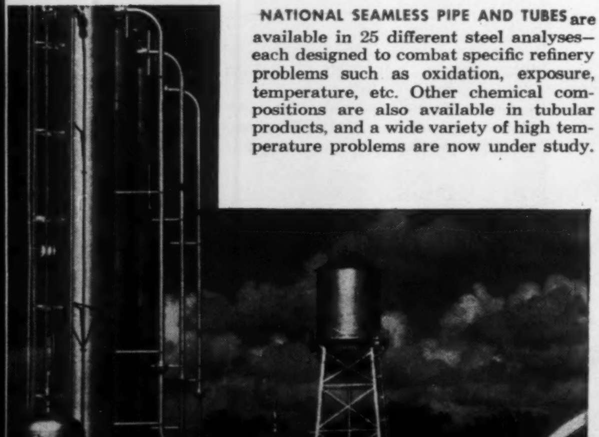
ENGINEERING OFFICES: Syracuse • Boston • Chicago • Detroit • Toronto • Pittsburgh • Cleveland • Milwaukee • Seattle • Houston • Philadelphia • Los Angeles • San Francisco

BACKBONE OF A NATIONAL

NATIONAL SEAMLESS TUBULAR STEEL PILES provide low cost for higher loads. Not only by shape and steel strength are pipe piles outstanding, they also provide a hollow form for filling with concrete. The sum of these qualities gives National Seamless Pipe Piles low cost for high bearing capacity.



THE NATIONAL SEAMLESS METHOD of manufacture is one of the most difficult forging operations in the steel industry. A billet of the finest steel is actually pierced to produce a seamless tube with absolutely uniform wall strength. No welds . . . no joints . . . no weaknesses.



NATIONAL SEAMLESS PIPE AND TUBES are available in 25 different steel analyses—each designed to combat specific refinery problems such as oxidation, exposure, temperature, etc. Other chemical compositions are also available in tubular products, and a wide variety of high temperature problems are now under study.

THE TOUGH SWEENEY POWERENCH has geared action for tightening or loosening nuts on dual wheels, aircraft propeller shafts, diesel engine cylinder heads, etc. The strength, uniformity, and dimensional accuracy of Seamless Tubing make it ideal for the manufacture of these rugged tools.

HUNDRED INDUSTRIES...

Seamless Pipe and Tubes

Whether you are manufacturing heavy-duty lug wrenches or erecting vast refineries, you'll want pipe and tubes that possess great strength . . . insure long life and complete dependability. In short, you'll want USS NATIONAL Seamless Pipe and Tubes.

NATIONAL Seamless combines to the highest degree the desirable qualities of strength, safety and workability. Uniform throughout and dimensionally accurate, NATIONAL Seamless Pipe and Tubes machine cleanly, weld readily, and promise smooth installation and long satisfactory service. Available in a complete range of steel analyses, wall thicknesses and diameters, every foot of NATIONAL Seamless is produced to exacting standards by the world's largest manufacturer of tubular steel products.

Bring your pipe and tubing problems to National Tube. Regardless of the application, our engineers are interested in discussing the problem with you.

NATIONAL TUBE DIVISION, UNITED STATES STEEL CORPORATION, PITTSBURGH, PA.

COLUMBIA-GENEVA STEEL DIVISION, SAN FRANCISCO, PACIFIC COAST DISTRIBUTORS   UNITED STATES STEEL EXPORT COMPANY, NEW YORK

SEE The United States Steel Hour. It's a full-hour TV program presented every other week by United States Steel. Consult your local newspaper for time and station.

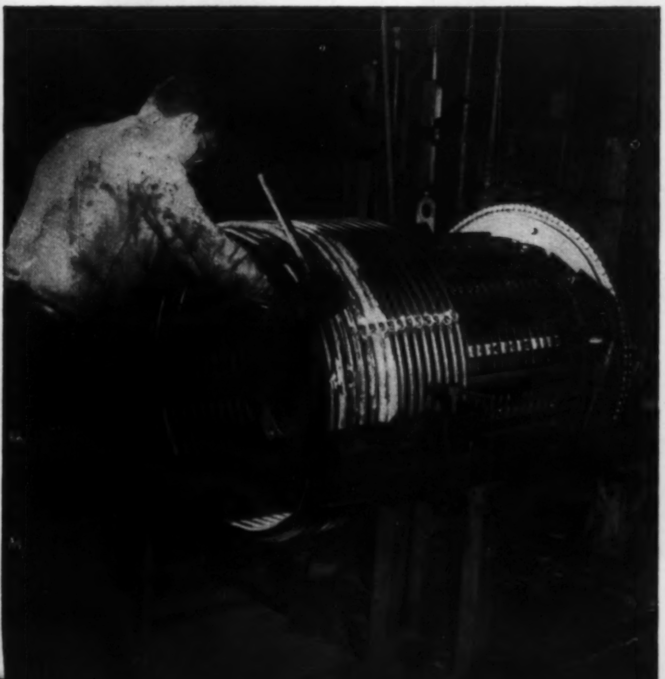
USS

National Seamless Pipe and Tubes

WALLS WITHOUT WELDS

UNITED STATES STEEL

POWER UNITS AND HEAT TRANSFER EQUIPMENT call for thin-walled, smooth-surfaced tubes that offer the *least* resistance to the flow of heat, yet the maximum resistance to pressure. One material possesses the ideal combination of properties for this type of service—Seamless Steel Tubes.



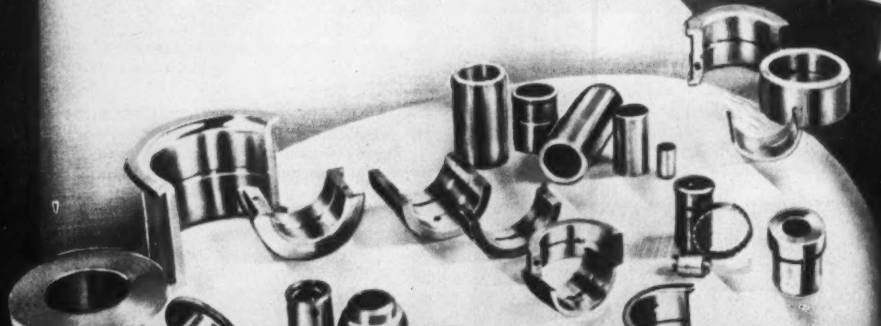
MASTS AND BOOMS OF NATIONAL SEAMLESS are widely used by the shipbuilding industry because they are extremely strong and rigid, yet comparatively light—easy to raise and maneuver. Their swaged and shrunk joints prevent slipping or telescoping.

ONE
bright spot
in the cost
picture . . .

JOHNSON BEARINGS

Labor costs, overhead and materials continue to rise. Yet . . . here is one item on which you can save money . . . Johnson Sleeve Bearings. They are low in first cost, economical in installation, and give long, satisfactory performance. Perhaps you are using more bearing than you need. Investigate Johnson Bearings. They are produced in industry's widest range of bearing metals and types: aluminum on steel, bronze on steel, babbitt on steel or bronze, powder metallurgy, cast bronze, cast aluminum alloy, sheet bronze and graphite inserts. Design or redesign to utilize the economies of Johnson Sleeve Bearings. Free engineering consultation is yours for the asking. Write.

JOHNSON BRONZE CO.
550 S. Mill St., New Castle, Pa.



JOHNSON JB BEARINGS
Sleeve-Type

Cool
and
Safe

on the
HOTTEST, TOUGHEST
Cutting jobs...

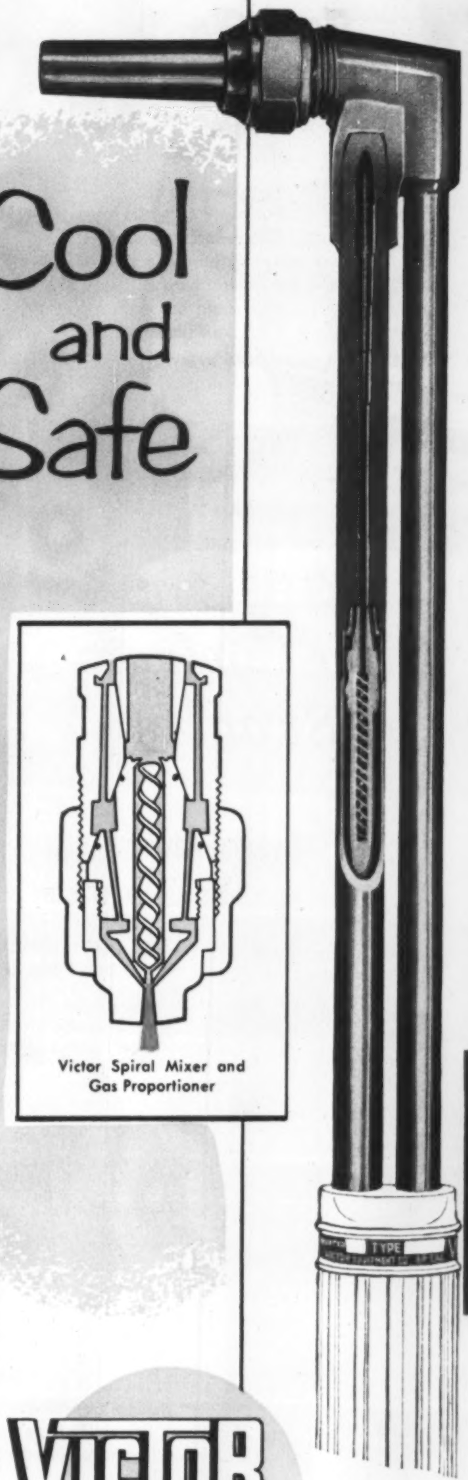
VICTOR

CUTTING TORCHES*

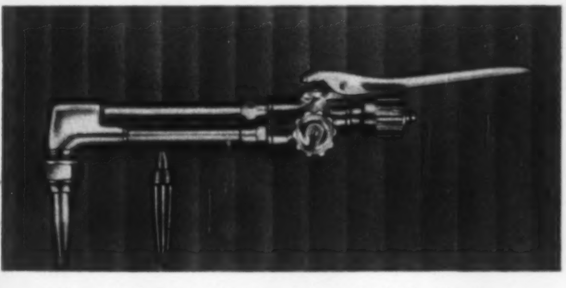
- * **With stainless steel head and tube assemblies.**
- * **Time-tested spiral mixers**

NOW all Victor torches and cutting attachments have rugged, stainless steel head and tube assemblies, plus time-tested spiral mixers to give you cool, safe cutting on your toughest, hottest cutting jobs. Stainless steel assembly absorbs heat slowly, withstands roughest use, is easier to maintain. Famous Victor spiral gas mixer prevents flashback and back fire, thoroughly mixes gases to make your gas dollars go further. Head and tube assembly is one unit, and can be replaced without buying a complete torch.

Test the Victor cutting torch on your most demanding, severest cutting job. See for yourself how cool it stays, how fast it cuts. Your Victor dealer will gladly demonstrate it. See him *today*.



Victor Spiral Mixer and Gas Proportioner



Cutting attachment, and cut-away of a typical Victor tip, showing carefully proportioned orifices. For best results, always use Victor tips with Victor torches.

VICTOR
for welding

VICTOR EQUIPMENT COMPANY

Mfrs. of welding & cutting equipment; hardfacing rods, blasting nozzles; cobalt & tungsten castings; straightline and shape cutting machines.

25

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ONE
bright spot
in the cost
picture . . .

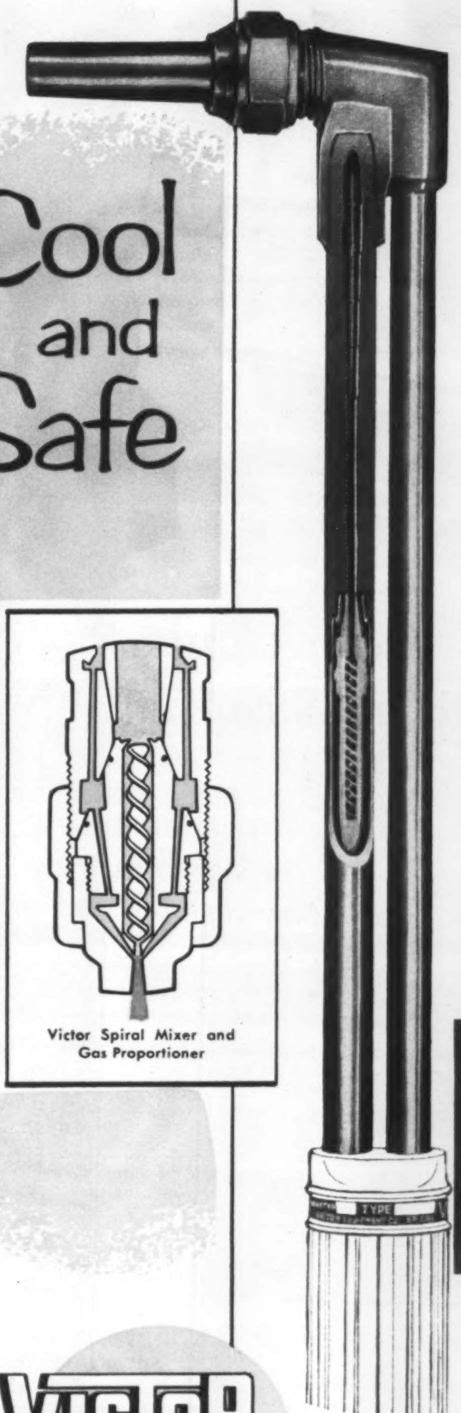
JOHNSON BEARINGS

Labor costs, overhead and materials continue to rise. Yet . . . here is one item on which you can save money . . . Johnson Sleeve Bearings. They are low in first cost, economical in installation, and give long, satisfactory performance. Perhaps you are using more bearing than you need. Investigate Johnson Bearings. They are produced in industry's widest range of bearing metals and types: aluminum on steel, bronze on steel, babbitt on steel or bronze, powder metallurgy, cast bronze, cast aluminum alloy, sheet bronze and graphite inserts. Design or redesign to utilize the economies of Johnson Sleeve Bearings. Free engineering consultation is yours for the asking. Write.

JOHNSON BRONZE CO.
550 S. Mill St., New Castle, Pa.

JOHNSON JB BEARINGS
Sleeve-Type

Cool and Safe



Victor Spiral Mixer and Gas Proportioner

on the HOTTEST, TOUGHEST Cutting jobs...

VICTOR CUTTING TORCHES*

- * **With stainless steel head and tube assemblies.**
- * **Time-tested spiral mixers**

NOW all Victor torches and cutting attachments have rugged, stainless steel head and tube assemblies, plus time-tested spiral mixers to give you cool, safe cutting on your toughest, hottest cutting jobs. Stainless steel assembly absorbs heat slowly, withstands roughest use, is easier to maintain. Famous Victor spiral gas mixer prevents flashback and back fire, thoroughly mixes gases to make your gas dollars go further. Head and tube assembly is one unit, and can be replaced without buying a complete torch.

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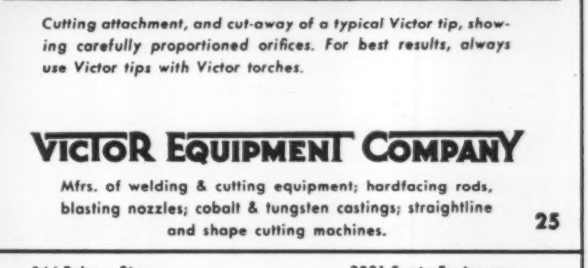

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VICTOR

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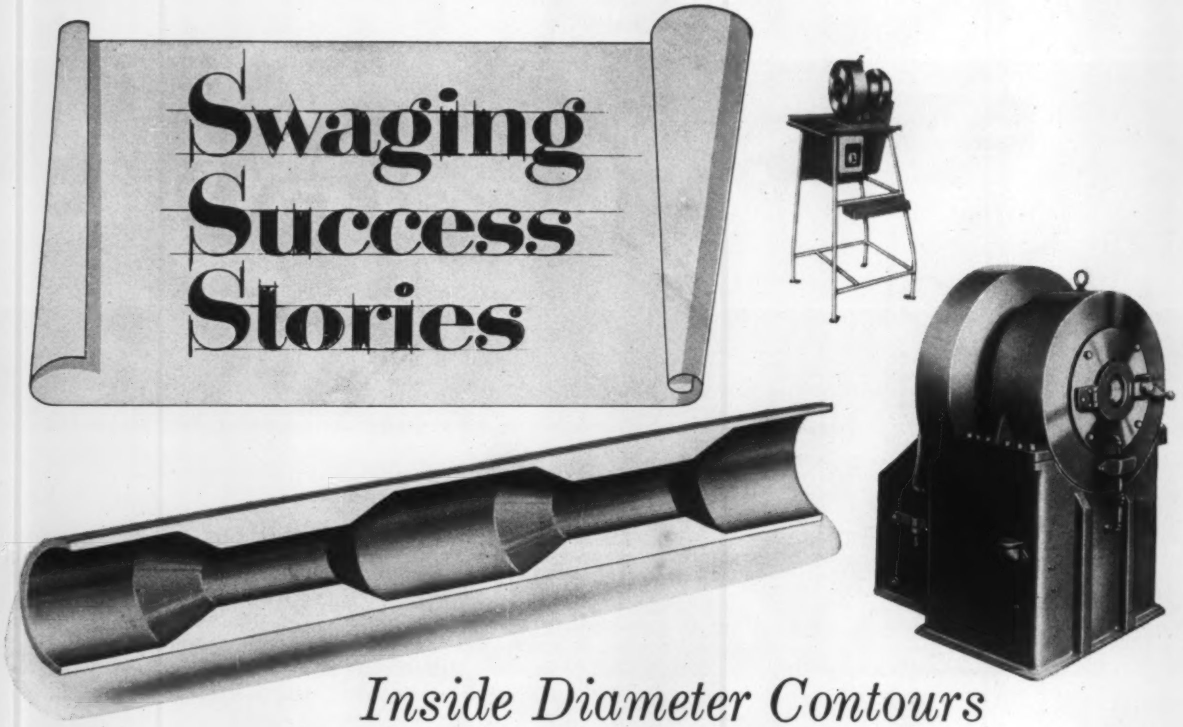
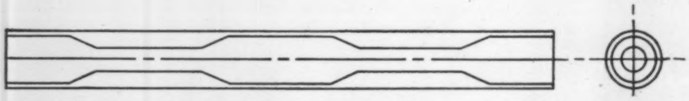
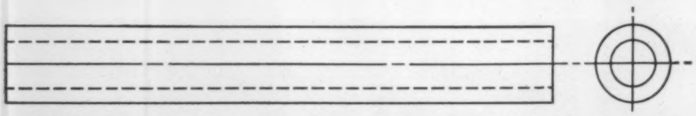


Swaging Success Stories

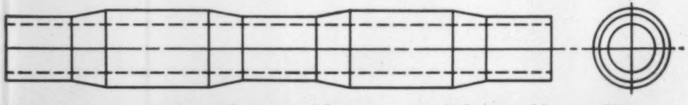
Inside Diameter Contours ... Easily Produced by Swaging



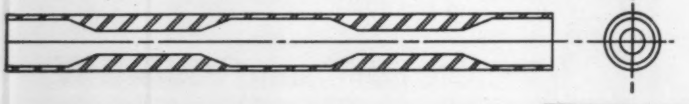
Machining multiple-diameter contours on the inside of cylindrical pieces (Fig. 1) is a difficult, time-consuming job.



Torrington's Swager experts start with tube of larger OD (Fig. 2) and machine the blanks to predetermined outside shape (Fig. 3).



Simply by swaging the outside to a straight, uniform diameter, the intricate contours are transferred to the inside (Fig. 4). Result: a sizeable saving in machining costs.



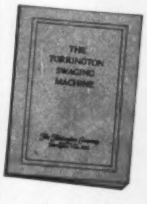
Swaging Advantages...
No Chips... No Waste... No Scrap

Swaging reduces metal—saves material—does not cut it away wastefully.

Swaging work hardens metal—gives it added strength, better finish and resiliency, dimensional accuracy.

Swaging is fast—can be done by unskilled workers to produce more pieces at lower cost.

Write for our informative booklet on Swaging that gives detailed descriptions of Torrington Rotary Swagers. It may show you how to achieve new savings in your own plant.



THE TORRINGTON COMPANY
Swager Department
150 North Street, Torrington, Conn.
Makers of Torrington Needle Bearings

TORRINGTON ROTARY SWAGING MACHINES

P&H Welding Positioner

Doubled Production

— free report shows how

A P&H positioner can cut your welding costs up to 60%, because it reduces waste-motion and fatigue. It is the only positioner available with a safe tilting range of 135 degrees. A pushbutton quickly and easily rotates, tilts, or moves the piece vertically to provide economical downhand welding.

Because welders are always working in a downhand position, they can deposit metal up to twice as fast.

Read about the money-saving, production-boosting features in the complete impartial report offered here. Just mail the coupon.

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CERTIFIED

Allis-Chalmers doubles welded housing production with P&H Welding Positioner

Labor and Burden Savings of $87.30 per Day Amount to $218,250 in 10 Years with One 3-Ton Positioner

By
Allis-Chalmers Manufacturing Company
Tractor Division, Milwaukee, Wis.

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3106

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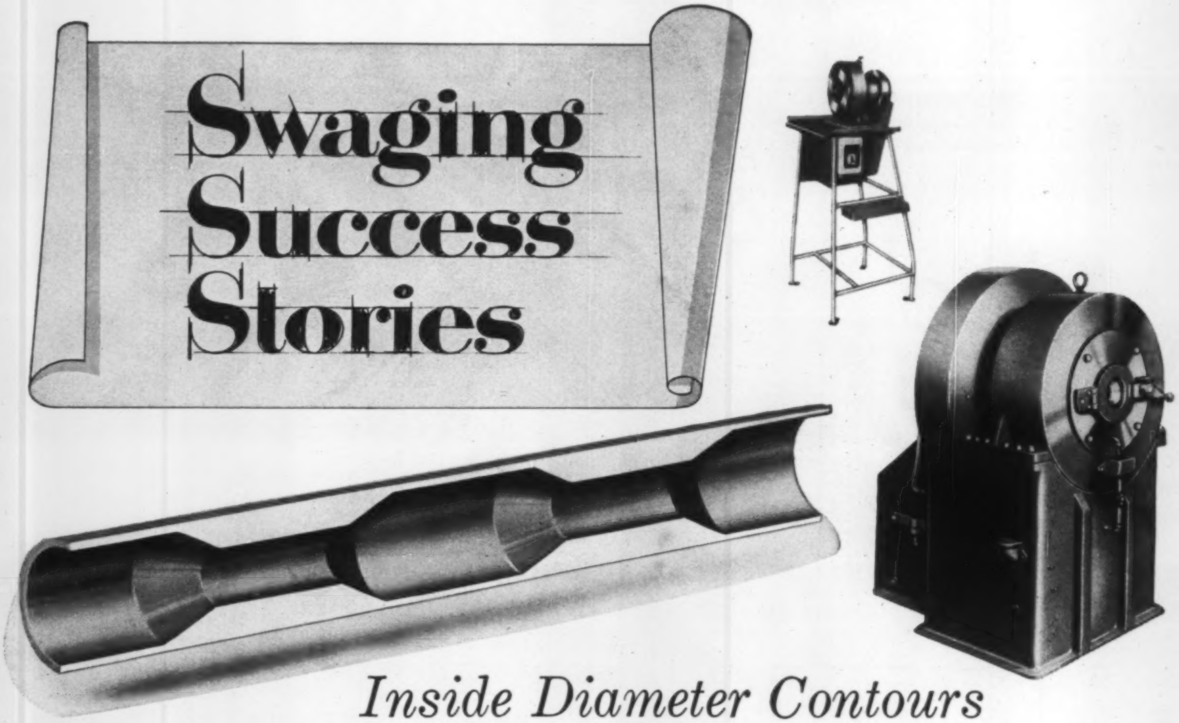
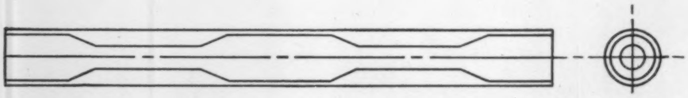
P&H welding equipment is manufactured and sold in Canada by REGENT EQUIPMENT MANUFACTURING COMPANY LTD., 455 King Street West • Toronto, Ontario, Canada

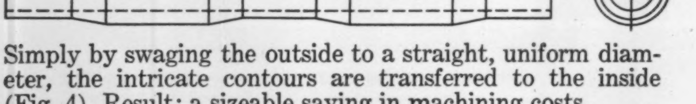
Swaging Success Stories



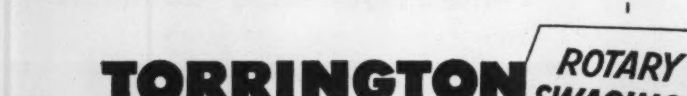
Inside Diameter Contours ... Easily Produced by Swaging



Machining multiple-diameter contours on the inside of cylindrical pieces (Fig. 1) is a difficult, time-consuming job.



Torrington's Swager experts start with tube of larger OD (Fig. 2) and machine the blanks to predetermined outside shape (Fig. 3).



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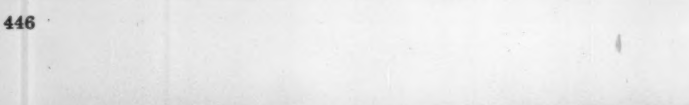

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THE TORRINGTON SWAGING MACHINE

THE TORRINGTON COMPANY
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TORRINGTON ROTARY SWAGING MACHINES

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Doubled Production

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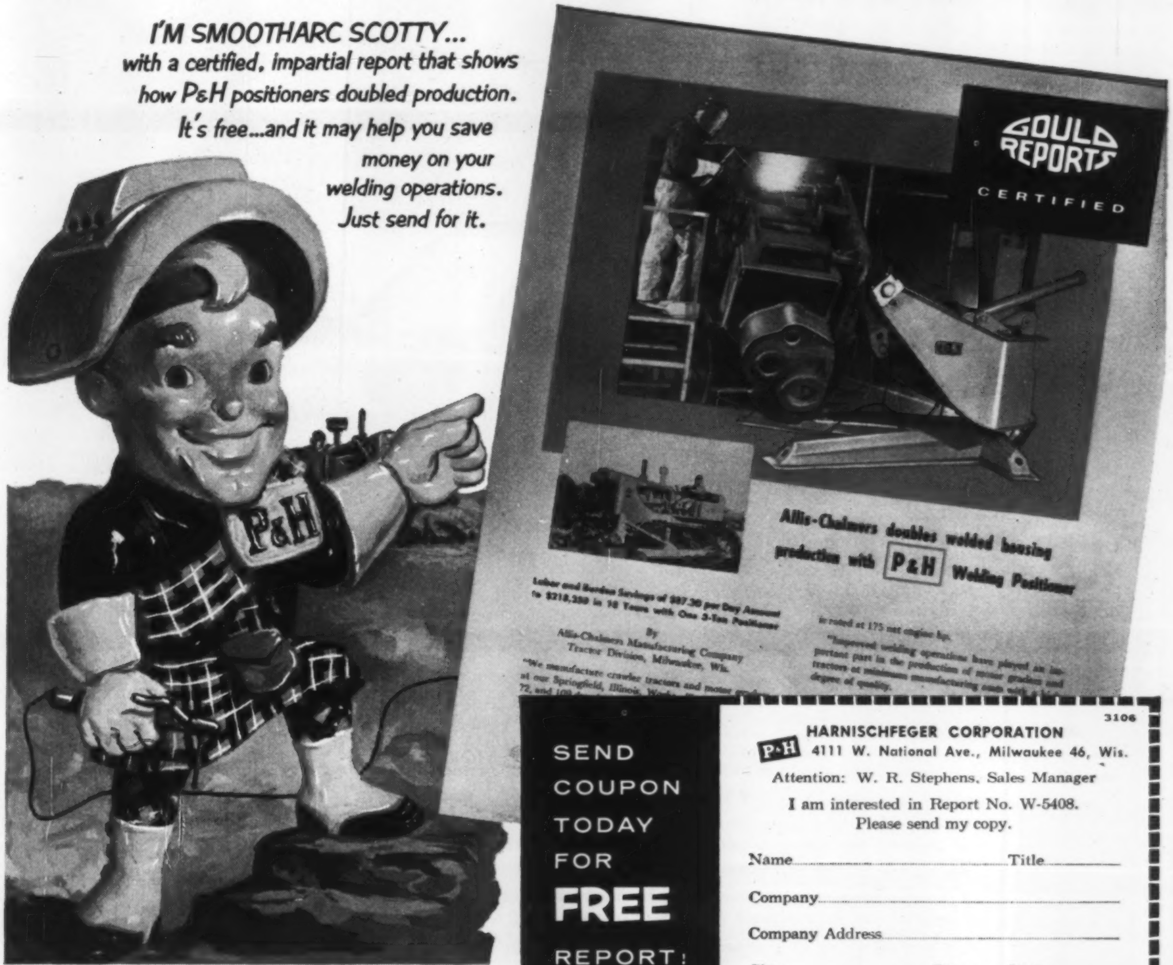
with a certified, impartial report that shows how P&H positioners doubled production. It's free...and it may help you save money on your welding operations. Just send for it.



Allis-Chalmers doubles welded housing production with P&H Welding Positioner

Labor and Burden Savings of $87.30 per Day Amount to $218,250 in 10 Years with One 3-Ton Positioner

By
Allis-Chalmers Manufacturing Company
Tractor Division, Milwaukee, Wis.

"We manufacture crawler tractors and motor graders at our Springfield, Illinois, Works

is rated at 175 net engine hp.

"Improved welding operations have played an important part in the production of motor graders and tractors at minimum manufacturing costs with a high degree of quality.

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HARNISCHFEGER CORPORATION
P&H 4111 W. National Ave., Milwaukee 46, Wis.
Attention: W. R. Stephens, Sales Manager
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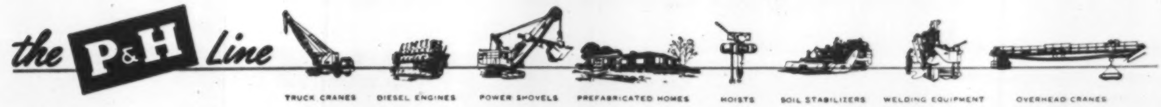
Name..Title..................
Company..
Company Address.......................................
City...............................Zone.........State..............



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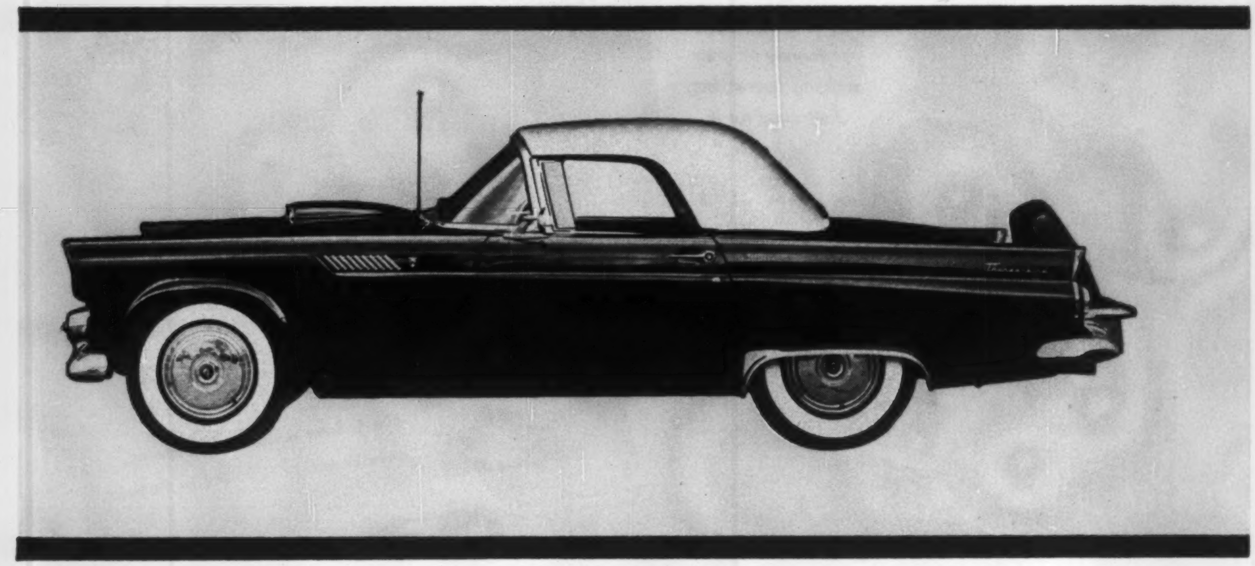
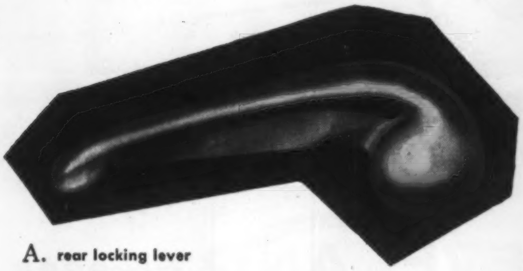
MUELLER BRASS CO.
FORGINGS

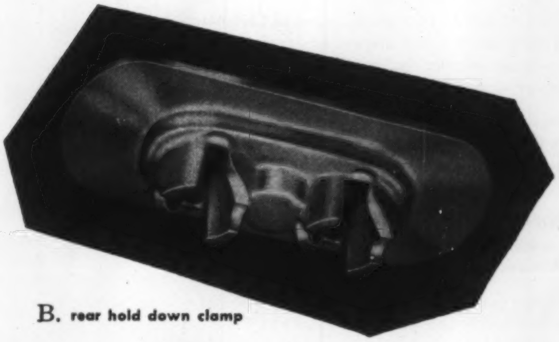
give THUNDERBIRD tops a snug fit the year around



The Motor States Products Division of Detroit Harvester Co.—a major supplier of top assemblies for convertibles—has found Mueller Brass Co. forgings an ideal answer for securely fastening down the tops on the Ford Thunderbird. In a summer shower or in the snow of winter the top is always snug and draft-free. There are a pair of each of the three Mueller Brass Co. forgings shown here used in locking the Thunderbird top securely around the sides and rear deck. The locking lever (A) is incorporated in the top and operates a locking pin that fastens into the rear hold down clamp (B). A pair of side hold down clamps (C) are located just behind each door opening and clamp fasteners on the top hook into these forgings to rigidly hold the top in position. These forgings hold the necessary close tolerances and provide an excellent surface for buffing and chrome plating. In addition, the price is favorable and deliveries are good. For these reasons, as well as their inherent strength and durability, a switch to Mueller Brass Co. forgings can prove advantageous. Write today for our engineering manual (No. H-58565) . . . or better yet, call in one of our engineers to investigate possible forging applications in your products.



A. rear locking lever



B. rear hold down clamp

C. side hold down clamp

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forgings
• brass
• bronze
• aluminum

Mueller Brass Co. Forgings Engineering Manual H-58565 ☐

Tuf Stuf Aluminum Bronze Alloys Engineering Manual H-58563 ☐

600 Series Bearing Alloys Engineering Manual FM-3000 ☐

Copper Base Alloys in Rod Form Engineering Manual FM-3010 ☐

METALS AND ALLOYS REVIEW

by **FRANK M. LEVY, Director of Research**

The other day one of our sales engineers stopped in to discuss gear applications and the subject got around to the amount of zinc permissable in gear and bearing alloys. Engineering books state that zinc is not desirable in bearing alloys. While this statement is true as regarding the commonly used copper-tin and copper-tin-lead alloys, it does not necessarily apply to other types of alloys. The 600 series bearing alloys, in which I am keenly interested, depend upon a high zinc content along with several other metal constituents to provide them with their fine bearing properties.

My explanation to our sales engineer was somewhat as follows: The question as to whether or not zinc is detrimental in a bearing alloy depends upon the remaining constituents in the alloy. A comparatively small amount of zinc is detrimental in a phosphor bronze alloy containing 80% copper, 10% tin and 10% lead. A zinc content of 4% is permissible in a bearing alloy containing 88% copper, 4% tin and 4% lead when used in an application not subject to heavy loads. In these alloys the tin combines with some of the copper to form a hard copper-tin constituent which is distributed through the soft copper matrix, or mat of copper. The higher the percentage of tin present, the greater the quantity of hard copper-tin constituent formed. Zinc also combines with copper increasing the hardness of the matrix. Therefore, when zinc is present along with a high tin content, the matrix becomes too hard and is "out of balance" resulting in poorer bearing qualities.

In the 600 series, copper, silicon, manganese, etc., are present with zinc. There is sufficient manganese present to combine with the silicon to form a purple manganese silicide which is embedded in the copper-zinc matrix. *Since the manganese-silicide constituent has a much higher micro hardness than the copper-tin constituent in phosphor bronze, the matrix of the 600 series alloys can have a higher hardness without impairing the bearing properties. In this instance, zinc is not detrimental but desirable because it produces an alloy with a high Brinell hardness which resists pounding and distortion.*

Like many engineers, we, too, were skeptical of the bearing properties of the first 600 alloy developed. A manufacturer of worm driven truck transmissions was having difficulty with the failure of chill cast high tin bronze gears in busses used in the hilly section of Los Angeles and Pittsburgh, and solved his problem by using gears made from 600 metal.

Since that time, we have had over a hundred successful applications on difficult bearing problems where cast bearing bronzes have failed. An interesting observation is that once a customer uses 600 alloys, he not only finds other applications, but continues to use it over a long period of years. Our original customers are still on our books.

In conclusion, we agree that zinc is detrimental to the bearing properties of the phosphor bronze type of alloys, but is of benefit to the 600 series alloys, *as it makes a harder matrix*, permitting the alloy to resist pounding action better than the softer phosphor bronze alloys.

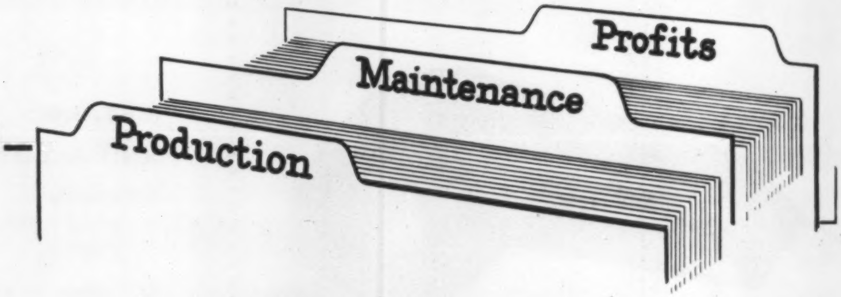
I've just about run out of space for this time but we'll have another subject for discussion later. If you have any problems or questions about non-ferrous alloys, just write me here at Mueller Brass Co. and we'll see what we can do.

MUELLER BRASS CO.

PORT HURON 19, MICHIGAN

170

If you're keeping tabs on—



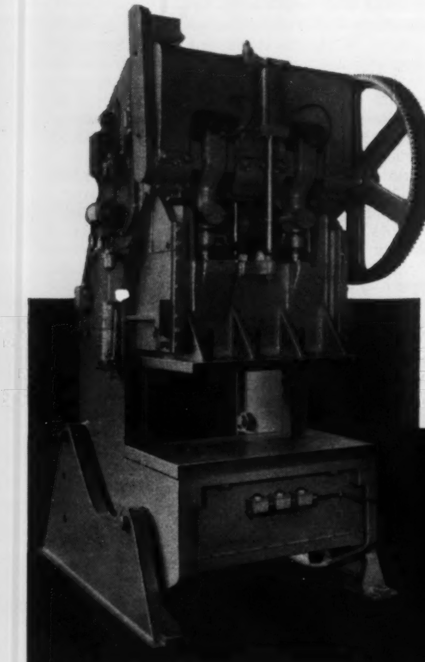
consider the advantages of CLEVELAND Presses

Here are three of our 11 specialized types of Cleveland Presses. Perhaps one of these may be your answer to greater stamping economy. If not, you can be sure that we can furnish you with just the *right* Cleveland for each of your particular needs.

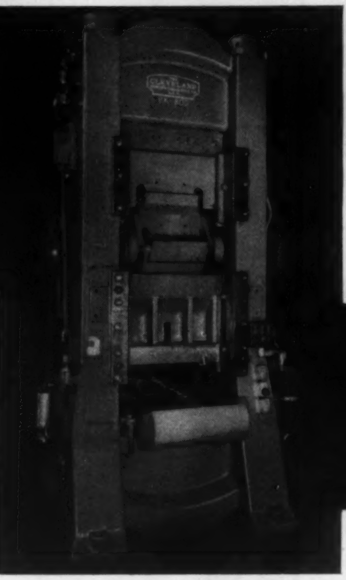
Construction of every Cleveland is simple and powerful with built-in reserve capacity for added safety and lasting accuracy. Rugged frame construction and extra long slide bearing surfaces eliminate slide deflection assuring stamping accuracy.

Our patented Cleveland Clutch gives you positive, fast control during all phases of operation. This reduces stamping rejects. Its light-weight construction demands less power for operation.

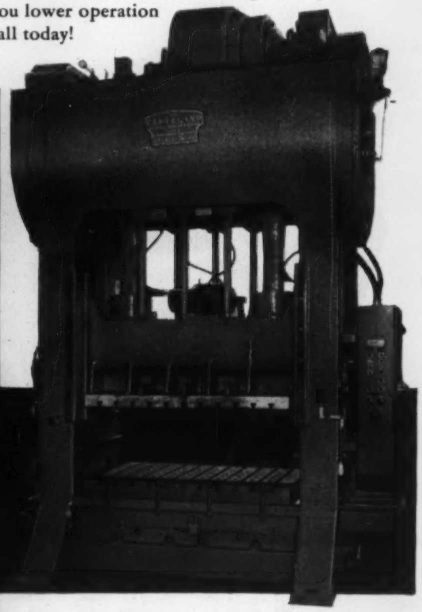
If you'll check the production and maintenance records of your older press equipment, we're sure you'll find that new Cleveland Presses designed to your specific requirements will give you lower operation costs for greater profits. Write or call today!



Cleveland 45G-42-75 Double Crank Open Back Gap Press 75 tons capacity.



Cleveland 8K Knuckle Joint Press equipped with conveyor type feed. 800 tons capacity.



Cleveland S2-250-72-42 Straight Sided Double Crank Press 250 tons capacity.

"Why Settle For Less Than a CLEVELAND Press"

THE CLEVELAND PUNCH & SHEAR WORKS CO.

Established 1880

POWER PRESSES – FABRICATING TOOLS

E. 40th & St. Clair Avenue, Cleveland 14, Ohio
Offices at: NEW YORK • CHICAGO • DETROIT
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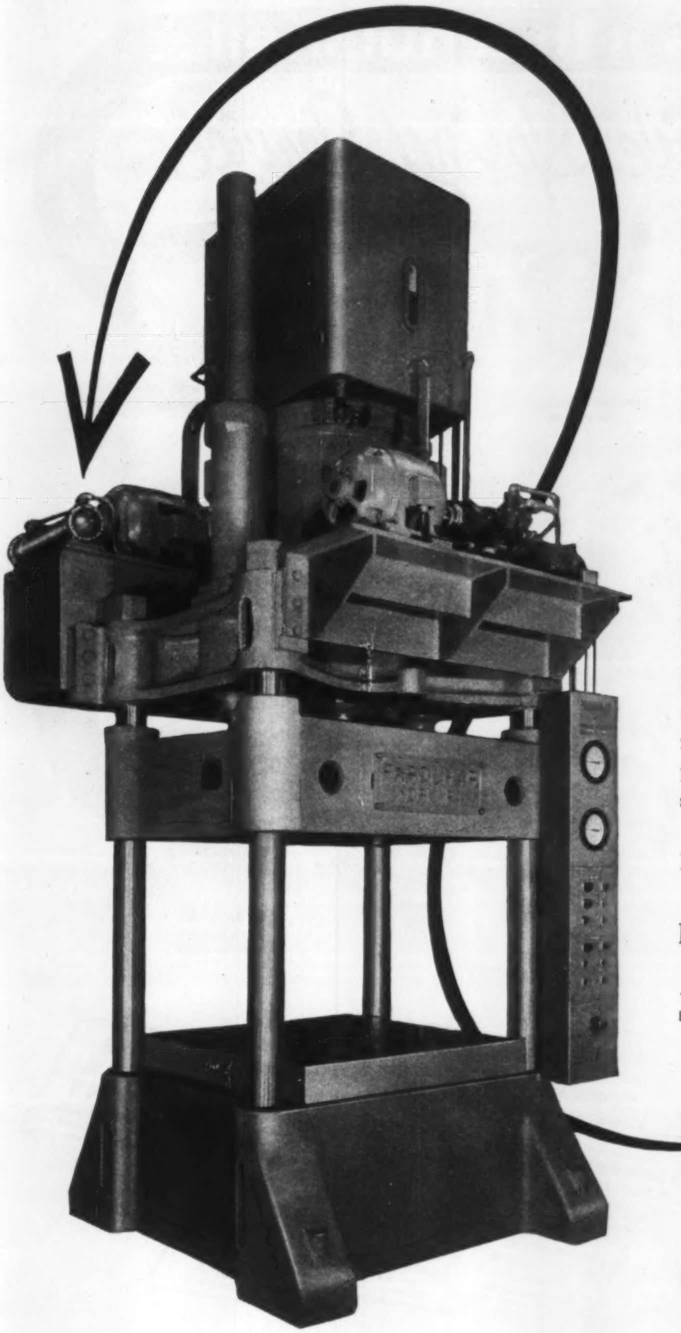
CITY FOUNDRY DIVISION • SMALL TOOL DEPARTMENT

this 250-ton Farquhar Press *depends on a Ross Exchanger* for consistent hydraulic performance



On this 250-ton, four-column Farquhar, as on numerous types of hydraulic presses throughout the metalworking world, a Ross Type BCF Exchanger has been factory-installed. It insures rated press capacity by holding hydraulic fluid temperatures in check *at all times.* Pump slippage from overheated, thinned oil is most effectively prevented.

Says A. B. Farquhar Company, "We are using Ross coolers because they are so easy to install, economical and do a good job. We know of no instance where a cooler has failed, causing any damage to our equipment. Every installation we have made is performing 100% satisfactory."

Preferred industry-wide, Ross Exchangers are featured as "built-in" equipment on engines, lubrication systems and hydraulic machines of every description to cool lube oil, jacket water and hydraulic fluid.

Pre-engineered and fully standardized, Ross Type BCF Exchangers are rugged, compact, easily installed and easily maintained. Assembled from mass produced parts, they're stocked in a wide range of sizes to meet *your* needs promptly.

For detailed information, request Bulletin 1.1K5.

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of
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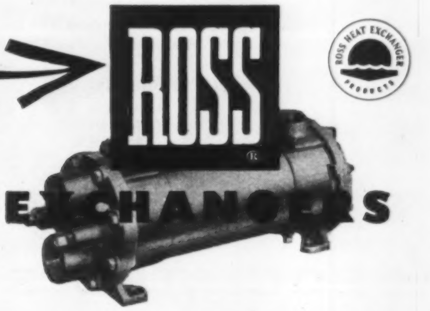

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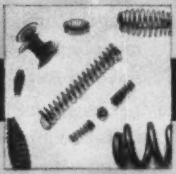

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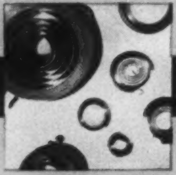

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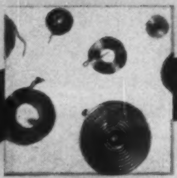

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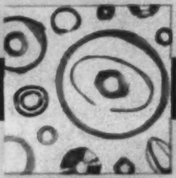

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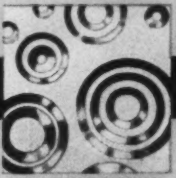

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(Advertisement)

Pumping Progress Report

FOR MECHANICAL ENGINEERS

An advertisement prepared by the Aldrich Pump Co., Member of Hydraulic Institute, U.S.A.

THE USE OF FLAMMABLE OIL as a hydraulic medium has two major objections — cost and the ever-present danger of fire. Providing a system that would overcome these objections was the problem presented to Aldrich Engineers by a manufacturer of die-cast parts for the automotive industry.

MAKE-UP OIL COST, for this manufacturer, was almost unbelievably high. The fire risk was great. Despite the best efforts of safety control, flash fires were inevitable.

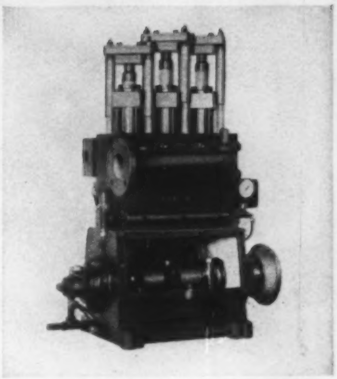
ONE SOLUTION was to pump water as the hydraulic fluid. But the manufacturer knew from experience that an ordinary pump couldn't do this job. What would we recommend?

WATER AS THE HYDRAULIC MEDIUM was our answer. And because Aldrich Direct Flow Pumps can pump water successfully, this manufacturer now operates a low cost, fire-free central hydraulic system. This die-caster gained other advantages by changing to his Aldrich-engineered central system. Aldrich Direct Flow Pumps feature fluid-end sectionalization, with a greater economy of maintenance and repair than was previously possible, horizontal valve action, parts standardization and simplicity of construction.

ALDRICH ENGINEERS will gladly consult with you on any pumping problem. Data Sheets describing the Aldrich series of Direct Flow Pumps will be sent to you on request. Ask for Data Sheet

63 — 2½" Stroke, 25 hp. Triplex
64A — 3" Stroke, 50 hp. Triplex
64, 64B — 5" Stroke, 100 to 200 hp. Series
67A — 6" Stroke, 300 to 900 hp. Series

Address your request to: The Aldrich Pump Company, 18 Pine Street, Allentown, Pa.



2½" Stroke, Triplex "POWR-PAC" Pump

. . . for your tough pumping problems specify ALDRICH

Solving tough pumping problems has become a specialty with Aldrich. Today, manufacturing plants from coast to coast are performing routine pumping assignments around the clock that were once real headaches for project and plant engineers.

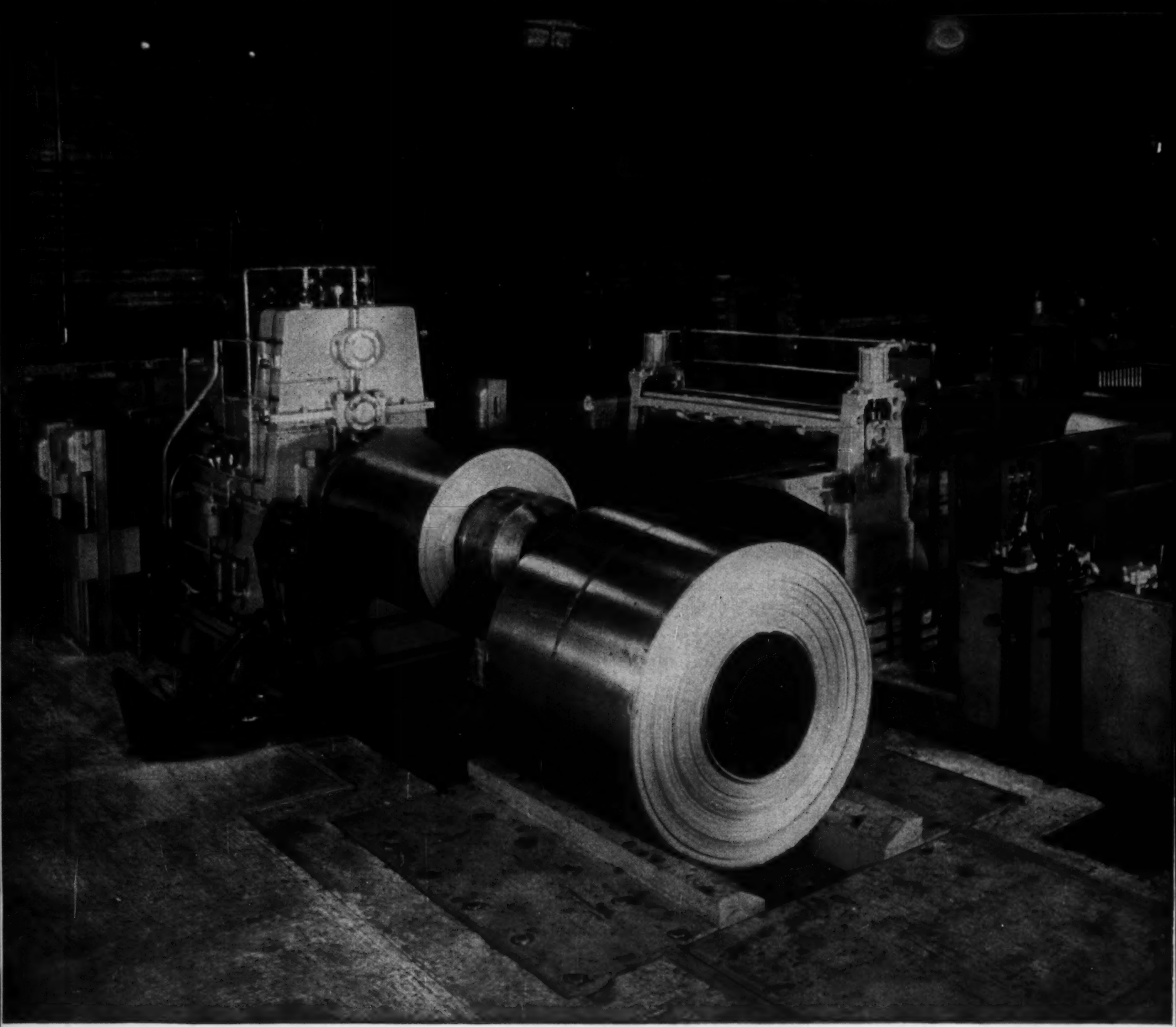
Aldrich Direct Flow Pumps, the basis for solving most of these problems, feature design innovations that provide economies of operation, maintenance and repair in addition to performing jobs not possible with ordinary pumps. If you have a pumping problem, pass it on to us.

TYPICAL METAL WORKING APPLICATIONS FOR ALDRICH PUMPS:

Descaling
Die Casting
Roll Balancing
Press Operation
Hydraulic Testing

Write today for Data Sheets describing the Direct Flow Pump Series.

THE ALDRICH PUMP COMPANY
Originators of the Direct Flow Pump
18 PINE STREET
ALLENTOWN, PA.
Representatives in principal cities



Wean Flying Shear Line (Entry End)

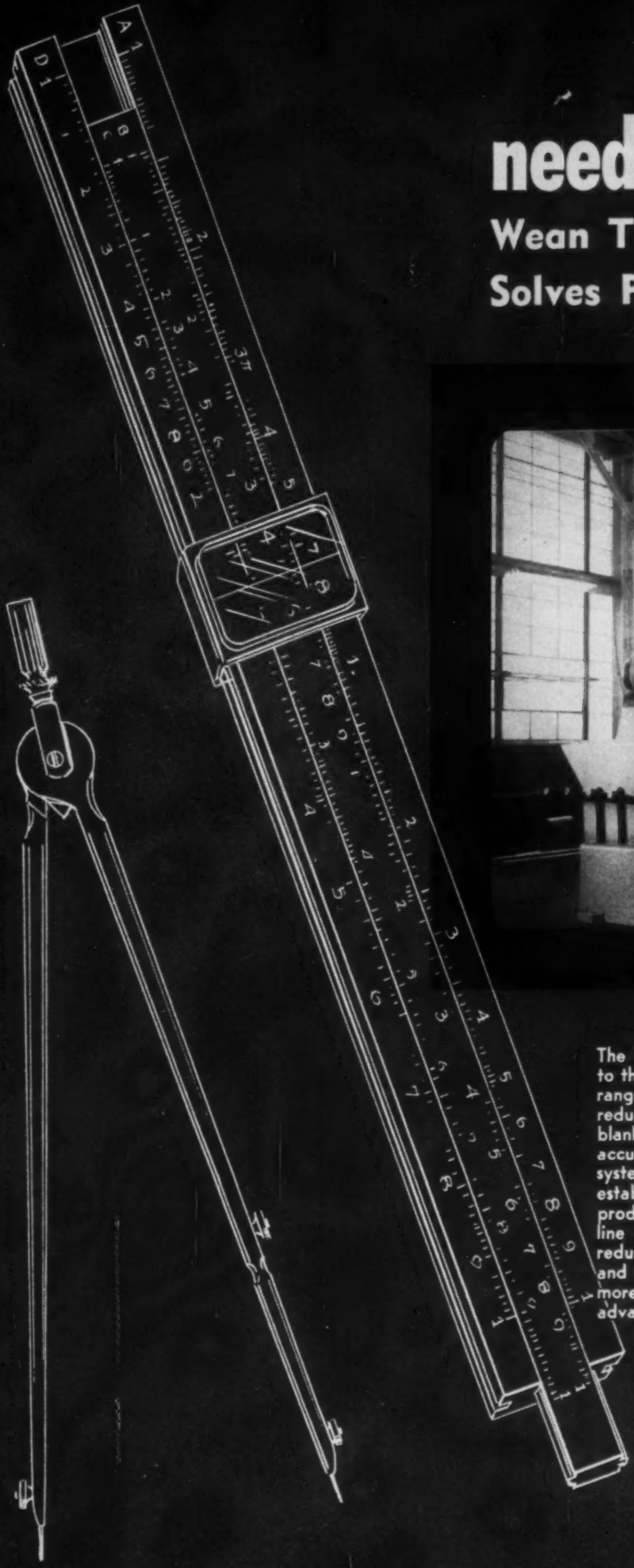
The WEAN ENGINEERING COMPANY, Inc.
WARREN ——————— OHIO

In the past decade steel making has made advancements in product development and production unmatched by any other industry.

The demand for better, more versatile steels, at rates that a few short years ago were beyond comprehension, has furnished the impetus. But the backbone of this tremendous revolution has been supplied by experienced metallurgists, who developed the materials, and engineering firms, like Wean, who designed and built the machinery necessary.

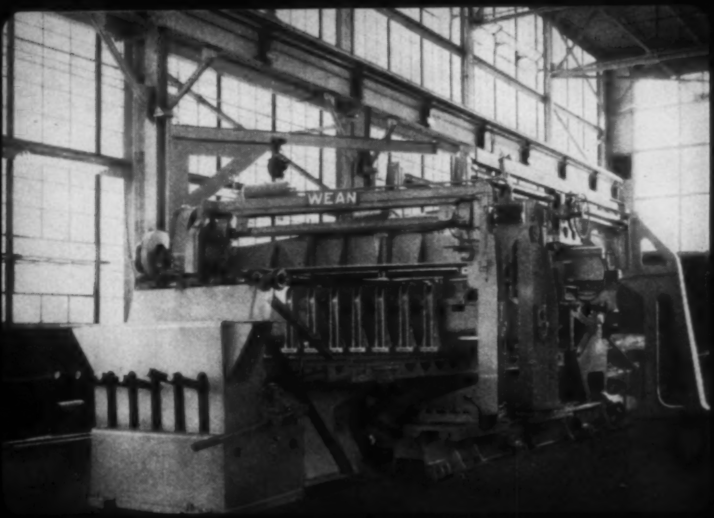
Equipment designed and built by Wean continues to establish performance records wherever it is in operation. This is the kind of progress that causes leading steel producers the world over to make certain they talk with Wean before they buy.

SPECIALISTS IN SHEET, STRIP AND TIN MILL EQUIPMENT



need an idea?

Wean Trapezoidal Shear Line Solves Problem for Auto Maker



The Wean Trapezoidal Shear Line was developed as an answer to the high speed blanking of irregularly shaped pieces in the broad range that can be described as trapezoids or parallelograms. This use reduces tremendously the cost of expensive die setup in major blanking presses. Two pieces are made at each index with the accuracy that can only be achieved by a measured length indexing system. The cut can range from 45° to 90° angles. The latter setting establishes the line as a straight cut-up unit with twice the normal production of conventional shear lines. At Wean, we consider this line as another important step forward in our policy of cost reduction through progressive engineering. People in the automotive and metal fabricating fields have come to look more and more toward Wean Equipment for spectacular advances in machinery for metal processing.

Wean

EQUIPMENT CORPORATION
CLEVELAND, OHIO

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How shall we tailor your pig?

PIG IRON has so many uses... goes into so many diverse products... that it must be tailored to meet the exact specifications of a given job.

As the West Coast's only fully-integrated steel plant, Kaiser Steel makes a specialty of meeting foundry specifications exactly.

How shall we tailor your pig?

Kaiser Steel

built to serve the West

Steel Mill Products: plates • hot rolled strip and sheet • cold rolled strip and sheet • tin plate • continuous weld pipe • electric weld pipe • alloy and carbon bars • bar shapes • structural shapes semi finished steels • pig iron • ingot molds • coke by-products • **Fabricating Division:** steel fabrication for construction, aircraft, missile and other industries • expanded fusion weld pipe reinforced concrete pipe • tanks • For specifications, write **KAISER STEEL CORPORATION** • **Los Angeles** • **Oakland** • **Seattle** • **Portland** • **Phoenix** • **Denver** • **Tulsa** • **New York**

MICROHONING*
PRECISION
in millionths of an inch

MICROHONING is inherently the most accurate of all production methods used for stock removal. Four major characteristics make Microhoning the controlled abrading process—that produces precision in every part.

Low velocity abrading technique
—low speeds (50-250 SFPM) minimize heat and surface stresses.

Sharp cutting abrasive grits at all times
—the self-dressing action provides clean, constant cutting and uniform surface finish.

Self-alignment of tool with bore
—use of the "float" principle . . . either the tool or workpart has universal action . . . automatically aligns tool and bore to correct bore inaccuracies without changing bore location.

Large area of abrasive in constant contact with work surface
—cutting pressure is evenly distributed over the surface by the thousands of minute abrasive grits collectively removing substantial amounts of stock. There is no localized heat to damage the surface or sub-structure of the metal.

An aircraft hydraulic pump block component, made up of cast iron and hardened steel (58-60 Rockwell "C"); nine ported cylinder bores are Microhoned to obtain surfaces which will maintain a "running" seal and which will not gall or "pick-up." From .006" to .008" stock is removed from each bore while holding these tolerances:

geometry—.000025"
diameter—.000050"

Steel surface finish is held under 8 microinches; cast iron, under 10 microinches. Bores of both sections are Microhoned in line in the same operation.

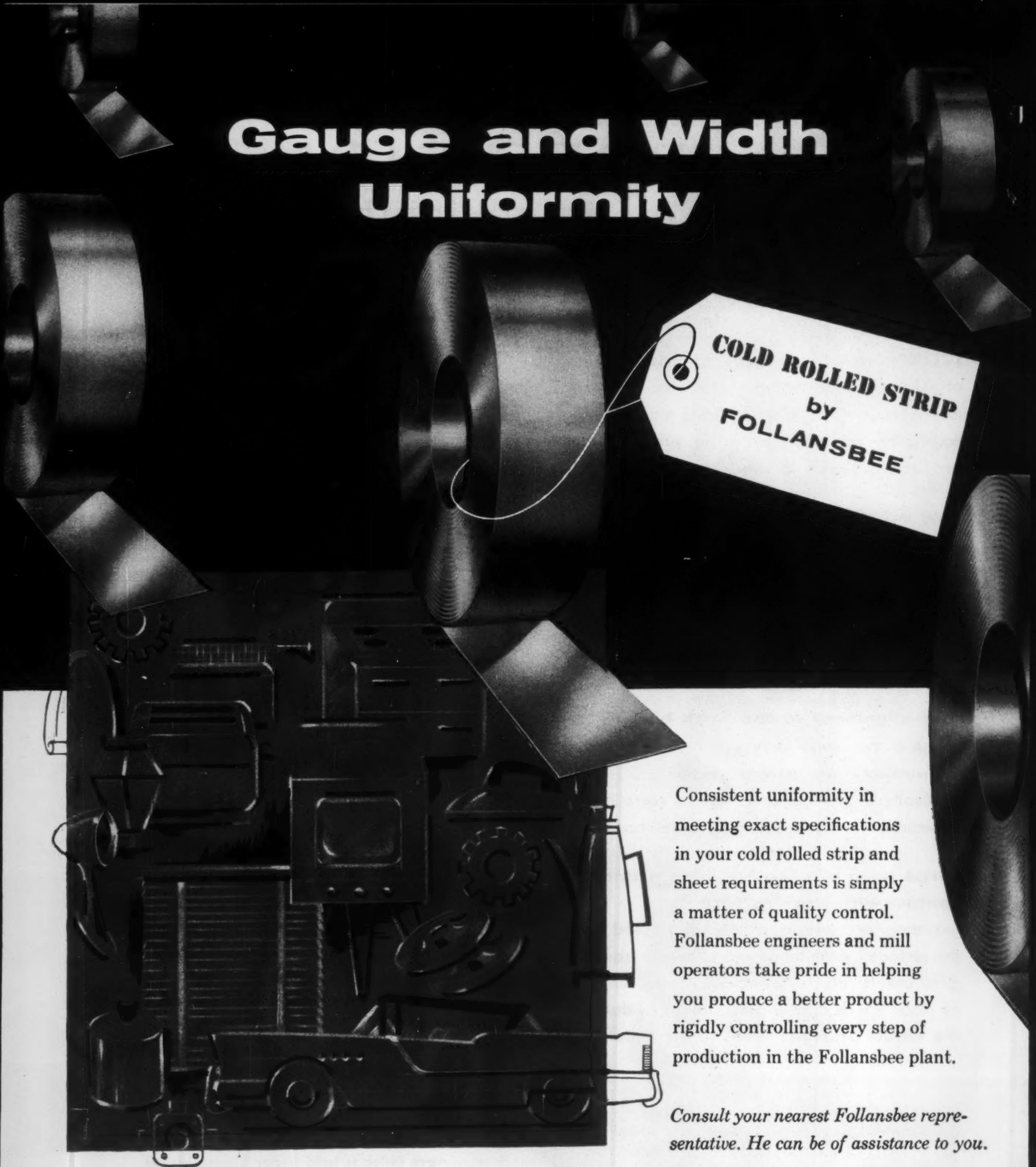
For a more complete story on this application, write for CROSS-HATCH, Vol. 7 No. 4.

*MICROHONING = Stock Removal + Geometry + Size Control + Surface Finish

MICROMATIC HONE CORPORATION

8100 SCHOOLCRAFT AVENUE • DETROIT 38, MICHIGAN

Gauge and Width Uniformity



Consistent uniformity in meeting exact specifications in your cold rolled strip and sheet requirements is simply a matter of quality control. Follansbee engineers and mill operators take pride in helping you produce a better product by rigidly controlling every step of production in the Follansbee plant.

Consult your nearest Follansbee representative. He can be of assistance to you.

FOLLANSBEE

STEEL CORPORATION

FOLLANSBEE, WEST VIRGINIA

Cold Rolled Strip • Seamless Terne Roll Roofing • Polished Blue Sheets and Coils

Sales Offices in Principal Cities

STEEL

January 2, 1956

Market Outlook

HERE are the prospects for iron and steel in 1956:

DEMAND— It should be a little stronger than it was in 1955. Metalworking executives think their 1956 dollar volume of sales will be 8 per cent above the record breaking $128 billion of last year (see page 105). Inflation won't account for all of that increase; so, most of it will come from a rise in physical volume. That means more steel should be used in 1956 than in 1955.

CONSUMPTION— If the record 1955 usage is exceeded, more than 79 million net tons of finished steel will have to be chewed up in U. S. plants. There'll be more people to use steel, for our population is destined to grow for a long time. In 1955, it expanded by 2.5 million people —equivalent to a Philadelphia. Other steel consumption stimulants are: Our rising standard of living. A rapidly moving technology, which obsoletes our worldly possessions.

INVENTORIES— Steel will be bought not only for current consumption but for later use. That means inventory building will be an aim. In the last year, consumers haven't been able to put away much—2.3 million net tons of finished steel, enough for only ten days at the current consumption rate. Prodding consumers to build inventories, if they can, is the inevitability of steel price increases.

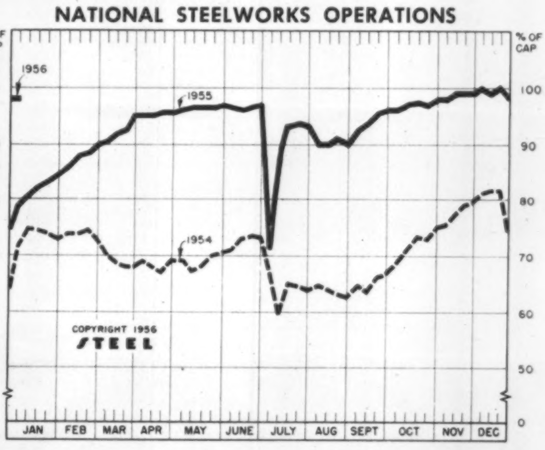
PRODUCTION— Steelmen bold enough to hazard an estimate talk in terms of a 1956 annual rate of 120 million net tons of steel for ingots and castings, although some are reluctant to predict beyond a record breaking first half with 60 million tons. Output of 117 million net tons in 1955 broke the 1953 record. The U. S. continued in 1955 to lead the world in steel production (see page 150). In poor second place was Russia, with 49.5 million tons. Iron Curtain countries poured 67,995,000 net tons of steel; the Free World made 225,380,000 tons. Adding 1,550,000 tons from miscellaneous countries makes a world total of 294,925,000 net tons—a record.

CAPACITY— Official figures for Jan. 1, 1956, should be available soon. They're expected to be about 2 million net tons over the 125,828,310 tons of Jan. 1, 1955. From here on, the steel industry will grow faster. Expansion announcements started coming out in September, 1955.

PRICES— They can go in only one direction: Up. That's because steel producers' production costs are rising, steelworkers' wages will go up in mid-1956 and steel companies must earn money to help pay the steep costs of plant replacement and expansion.

LABOR— A big threat to record steel production in 1956 is labor contract negotiations. Present agreements, excepting insurance and pensions, expire June 30. Insurance comes up later in 1956, and pensions in 1957. A real try for a supplementary unemployment program will be made in June.

JOB TO BE DONE— Drive for SUP will help galvanize steel management to find a way to regularize production. Another incentive is the high price of facilities. It's costly to provide for peak periods. The penalty for being a feast or famine industry may force a reform.



DISTRICT INGOT RATES

(Percentage of Capacity Engaged)

	Week Ended Jan. 1	Change	Same Week 1955	Same Week 1954
Pittsburgh	100	+ 0.5	74.5	83
Chicago	98.5	— 0.5	83.5	86.5
Mid-Atlantic	93.5	— 4.5	70	84
Youngstown	97	+ 2	85	75
Wheeling	98	0	83	68
Cleveland	98	+ 5	98	68
Buffalo	105	+ 5	100	55
Birmingham	94.5	0	67	80
New England	92	0	70	73
Cincinnati	92.5	0	74	67.5
St. Louis	105	+ 5	74.5	83
Detroit	100	+ 5	80.5	93.5
Western	98	0	69	86
National Rate	98	0	79	71.5

INGOT PRODUCTION‡

	Week Ended Jan. 1	Week Ago	Month Ago	Year Ago
INDEX (1947-1949=100)	148.5†	146.5†	146.7	122.0
NET TONS (In thousands)	2,386†	2,353†	2,356	1,960

*Change from preceding week's revised rate. †Estimated. ‡Amer. Iron & Steel Institute. Weekly capacity (net tons): 2,413,278 in 1955-56; 2,384,549 in 1954.

Price Indexes and Composites

FINISHED STEEL PRICE INDEX (Bureau of Labor Statistics)

	Dec. 27 1955	Dec. 20 1955	Month Ago	Dec. Average
(1947-1949=100)	155.1†	155.1	154.6	154.8

AVERAGE PRICES OF STEEL (Bureau of Labor Statistics)

Week Ended Dec. 27

Prices include mill base prices and typical extras and deductions. Units are 100 lb except where otherwise noted in parenthesis. For complete description of the following products and extras and deductions applicable to them write to STEEL.

Rails, Standard, No. 1	$4.800
Rails, Light, 40 lb	6.217
Tie Plates	5.625
Axles, Railway	8.000
Wheels, Freight Car, 33 in. (per wheel)	52.50
Plates, Carbon	4.950
Structural Shapes	4.867
Bars, Tool Steel, Carbon (lb)	0.460
Bars, Tool Steel Alloy, Oil Hardening Die (lb)	0.560
Bars, Tool Steel, H.R., Alloy, High Speed W 6.75, Cr 4.5, V 2.1, Mo 5.5, C 0.60 (lb)	1.185
Bars, Tool Steel, H.R., Alloy, High Speed W-18, Cr 4, V 1 (lb)	1.680
Bars, H.R., Alloy	9.375
Bars, H.R., Stainless, 303 (lb)	0.450
Bars, H.R., Carbon	5.350
Bars, Reinforcing	5.313
Bars, C.F., Carbon	8.660
Bars, C.F., Alloy	12.175
Bars, C.F., Stainless, 302 (lb)	0.468
Sheets, H.R., Carbon	5.145
Sheets, C.R., Carbon	6.214
Sheets, Galvanized	7.690
Sheets, C.R., Stainless, 302 (lb)	0.588
Sheets, Electrical	$10.183
Strip, C.R., Carbon	8.243
Strip, C.R., Stainless, 403 (lb)	0.444
Strip, H.R., Carbon	5.406
Pipe, Black, Buttweld (100 ft)	16.746
Pipe, Galv., Buttweld (100 ft)	20.465
Pipe, Line (100 ft)	164.379
Casing, Oil Well, Carbon (100 ft)	165.120
Casing, Oil Well, Alloy (100 ft)	244.670
Tubes, Boiler (100 ft)	39.470
Tubing, Mechanical, Carbon	20.980
Tubing, Mechanical, Stainless, 304 (100 ft)	178.897
Tin Plate, Hot-dipped, 1.25 lb	8.933
Tin Plate, Electrolytic, 0.25 lb	7.633
Black Plate, Canmaking Quality	6.733
Wire, Drawn, Carbon	8.575
Wire, Drawn, Stainless 430 (lb)	0.578
Bale ties (bundle)	6.473
Nails, Wire, 8d Common	8.595
Wire, Barbed (80-rod spool)	7.847
Woven Wire Fence (20-rod roll)	18.635

STEEL's FINISHED STEEL PRICE INDEX*

	Dec. 28 1955	Week Ago	Month Ago	Year Ago	5 Yrs. Ago
Index (1935-39 av.=100)	208.90	208.90	208.90	194.53	167.67
Index in cents per lb	5.659	5.659	5.659	5.270	4.545

STEEL's ARITHMETICAL PRICE COMPOSITES

Finished Steel, NT*	$127.68	$127.68†	$127.95	$117.95	$103.50
No. 2 Fdry, Pig Iron, GT	58.99	58.99	58.99	56.54	52.54
Basic Pig Iron, GT	58.49	58.49	58.49	56.04	52.16
Malleable Pig Iron, GT	59.77	59.77	59.77	57.27	53.27
Steelmaking Scrap, GT	51.83	50.67	47.00	32.83	45.50

*For explanation of weighted index see STEEL, Sept. 19, 1949, p. 54; of arithmetical price composite, STEEL, Sept. 1, 1952, p. 130.

†Revised.

Comparison of Prices

Comparative prices by districts, in cents per pound except as otherwise noted. Delivered prices based on nearest production point.

FINISHED STEEL	Dec. 28 1955	Week Ago	Month Ago	Year Ago	5 Yrs. Ago
Bars, H.R., Pittsburgh	4.65	4.65	4.65	4.30	3.70
Bars, H.R., Chicago	4.65	4.65	4.65	4.30	3.70
Bars, H.R., deld. Philadelphia	4.90	4.90	4.90	4.55	4.18
Bars, C.F., Pittsburgh	5.90	5.90	5.90	5.40	4.55
Shapes, Std., Pittsburgh	4.60	4.60	4.60	4.25	3.65
Shapes, Std., Chicago	4.60	4.60	4.60	4.25	3.65
Shapes, deld., Philadelphia	4.88	4.88	4.88	4.53	3.90
Plates, Pittsburgh	4.50	4.50	4.50	4.225	3.70
Plates, Chicago	4.50	4.50	4.50	4.225	3.70
Plates, Coatesville, Pa.	4.80	4.80	4.80	4.225	4.15
Plates, Sparrows Point, Md.	4.50	4.50	4.50	4.225	3.70
Plates, Claymont, Del.	4.80	4.80	4.80	4.225	4.15
Sheets, H.R., Pittsburgh	4.325	4.325	4.325	4.05	3.60-3.75
Sheets, H.R., Chicago	4.325	4.325	4.325	4.05	3.60
Sheets, C.R., Pittsburgh	5.325	5.325	5.325	4.95	4.35
Sheets, C.R., Chicago	5.325	5.325	5.325	4.95	4.35
Sheets, C.R., Detroit	5.325-5.425	5.325-5.425	5.325-5.425	5.10	4.30
Sheets, Galv., Pittsburgh	5.85	5.85	5.85	5.45	4.80
Strip, H.R., Pittsburgh	4.325	4.325	4.325	4.05	3.75-4.00
Strip, H.R., Chicago	4.325	4.325	4.325	4.05	3.50
Strip, C.R., Pittsburgh	6.25	6.25	6.25	5.75	4.65-5.25
Strip, C.R., Chicago	6.25-6.35	6.25-6.35	6.35	5.85	4.50-4.90
Strip, C.R., Detroit	6.35	6.35	6.35	5.90	4.35-5.60
Wire, Basic, Pittsburgh	6.25	6.25	6.25	5.75	4.85-5.10
Nails, Wire, Pittsburgh	7.60	7.60	7.60	6.85	5.90-6.20
Tin plate (1.50 lb), box, Pitts.	$9.45	$9.45	$9.45	$9.05	$7.50

SEMIFINISHED STEEL

Billets, Forging, Pitts. (NT)	$84.50	$84.50	$84.50	$78.00	$66.00
Wire rods, $\frac{7}{32}$-⅝" Pitts.	5.025	5.025	5.025	4.675	4.10-4.30

PIG IRON, Gross Ton

Bessemer, Pitts.	$59.50	$59.50	$59.50	$57.00	$53.00
Basic, Valley	58.50	58.50	58.50	56.00	52.00
Basic, deld. Phila.	62.16	62.16	62.16	59.66	56.39
No. 2 Fdry, Pitts.	59.00	59.00	59.00	56.50	52.50
No. 2 Fdry, Chicago	59.00	59.00	59.00	56.50	52.50
No. 2 Fdry, Valley	59.00	59.00	59.00	56.50	52.50
No. 2 Fdry, deld. Phila.	62.66	62.66	62.66	55.16	56.89
No. 2 Fdry, Birm.	55.00	55.00	55.00	52.88	48.88
No. 2 Fdry (Birm.) deld. Cin.	62.70	62.70	62.70	60.58	55.58
Malleable, Valley	59.00	59.00	59.00	56.50	52.50
Malleable, Chicago	59.00	59.00	59.00	56.50	52.50
Ferromanganese, Duquesne	190.00†	190.00†	190.00†	190.00†	188.00*

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†74-76% Mn, net ton. *75-82% Mn, gross ton, Etna, Pa.

SCRAP, Gross Ton (Including broker's commission)

No. 1 Heavy Melt, Pitts.	$51.00	$50.50	$46.50	$32.50	$46.50
No. 1 Heavy Melt, E. Pa.	55.00	52.00	48.00	32.00	45.00
No. 1 Heavy Melt, Chicago	49.50	49.50	46.50	34.00	45.00
No. 1 Heavy Melt, Valley	52.50	52.50	52.50	34.50	46.25
No. 1 Heavy Melt, Cleve.	51.50	51.50	49.50	32.50	45.75
No. 1 Heavy Melt, Buffalo	45.50	45.50	43.50	30.50	44.88
Rails, Rerolling, Chicago	71.00	71.00	69.50	53.00	67.00
No. 1 Cast, Chicago	50.50	50.50	49.50	40.00	63.00

COKE, Net Ton

Beehive, Furn, Connlsvl.	$14.125	$14.125	$13.625	$13.75	$14.75
Beehive, Fdry, Connlsvl.	16.50	16.50	16.50	16.75	17.50
Oven, Fdry, Chicago	25.75	25.75	25.75	24.50	21.00

Daily Nonferrous Price Record

	Dec. 27 Price	Last Change	Previous Price	Nov. Avg.	Oct. Avg.	Dec. 1954 Avg.
Copper	43.00–50.00	Dec. 15, 1955	43.00–49.00	44.420	44.594	30.000
Lead	15.30	Sept. 26, 1955	14.80	15.300	15.300	14.800
Zinc	13.00	Oct. 21, 1955	13.00–13.50	13.000	13.020	11.500
Tin	109.375	Dec. 20, 1955	109.50	97.825	96.230	88.649
Nickel	64.50	Nov. 24, 1954	60.00	64.500	64.500	64.500
Aluminum	24.40	Aug. 8, 1955	23.20–24.40	24.400	24.400	22.200
Magnesium	32.50	Aug. 16, 1955	28.50	32.500	32.500	27.000

Quotations in cents per pound based on: COPPER, deld. Conn. Valley; LEAD, common grade, deld. St. Louis; ZINC, prime western, E. St. Louis; TIN, Straits, deld. New York; NICKEL, electrolytic cathodes, 99.9%, base size at refinery, unpacked; ALUMINUM, primary ingots, 99 + %, deld.; MAGNESIUM, 99.8%, Freeport, Tex.

What You Can Use the Markets Section for:

- **A source of price information.**
  Current prices are reported each week. Price changes are shown in italics. Price trends are shown in tables of indexes and comparisons.
- **A directory of producing points.**
  Want to know who makes something, or where it is made? The steel price tables alphabetically list the cities of production and indicate the producing company. If you are a buyer, you may want to make a map showing comparative distances of sources of supply and to help you compute freight costs. If you are a seller of supplies you can make a map to spot your sales possibilities.
- **A source of price data for making your own comparisons.**
  Maybe you want to keep a continuous record of price spread between various forms of steel. You can get your base price information from STEEL's price tables.
- **A source of information on market trends.**
  Newsy items tell you about the supply-demand situation of materials, including iron and steel, nonferrous metals and scrap. Other articles analyze special situations of interest and importance to you.
- **Reports on iron and steel production, and materials and product shipments.**

A NEW PLANT

FOR A NEW

20th Century

persuasive abrasive

Recently we put our new Toledo, Ohio plant into production. It is specifically designed for you.

From laboratory microscopes to grading screens, every facility of this plant has been selected to furnish you the best metallic abrasive for the lowest possible price.

This modern factory — The Toledo Steel Shot Division — will be devoted to the production of a brand new steel shot, Toledo REALSTEEL — the newest member in our complete line of 20th Century quality shot and grit.

Write for our newest literature.

The CLEVELAND METAL ABRASIVE Co.

802 East 67th St., Cleveland 8, Ohio
Howell Works: Howell, Michigan
Toledo Steel Shot Division: Toledo, Ohio

One of the world's largest producers of quality shot, grit and powder — Hard Iron — Malleable (*Normalized) — Cut Wire — Cast Steel (Realsteel)

**Copyrighted trade name*

TOLEDO STEEL SHOT DIVISION
CLEVELAND METAL ABRASIVE COMPANY

Nonferrous Metals

Armed with rapidly expanding order books, the nonferrous metals industry is confident its 1956 business will be even better than 1955's

Nonferrous Metal Prices, Pages 464 & 465

YOU CAN COUNT all the pessimists in the nonferrous industry on the fingers of one hand.

Aluminum will have its fifth consecutive record-breaking year in '56, with primary production reaching the 3.3-billion-pound mark. Copper, labor willing, will catch up with demand. Lead and zinc markets will remain firm. Tin will be more plentiful. Titanium and magnesium will take another step toward maturity.

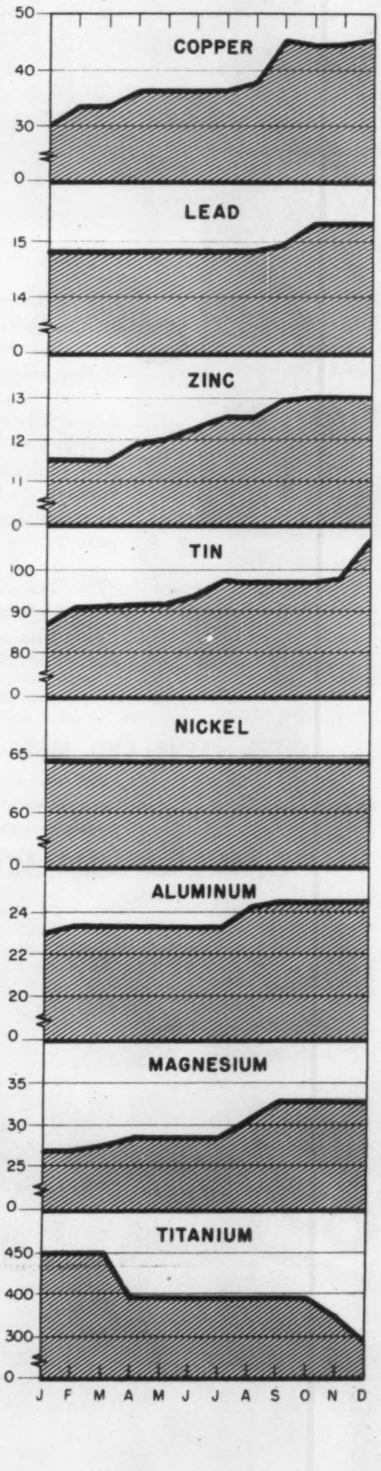
Aluminum . . .

Aluminum advocates are brimming with confidence. Examples: "We are closing our strongest year in history and are looking for even greater growth and demand in 1956," says I. W. Wilson, president, Aluminum Co. of America. R. S. Reynolds Jr., president, Reynolds Metals Co., predicts: "More aluminum will be used in '56 than ever before." And so it goes. Wherever you turn in the aluminum industry, there is confidence, which is being backed by extensive expansion programs.

Copper . . .

Copper producers are pointing to the fact that there will be an easing of the supply situation and a more stable price structure during the coming months. With December's strikes cutting back current supply, it is difficult to imagine how there can be abundant supplies of the red metal before the second half of 1956. Last year was one of the most hectic in the history of the industry. Close to 150,000 tons of refined copper were lost due to strikes in this country, Chile and Africa. Outlook: Copper will remain tight during the first half of 1956. While prices could dip sometime during the year, one more strike could send prices up instead of down.

How Prices Went in 1955



Lead and Zinc . . . .

Lead and zinc supply and demand will be in good balance throughout the coming year. With most automakers estimating that production will come close to or be better than 1955's, zinc producers are anticipating that the demand for prime western and special, high-grade zinc will have to be expanded. Last year's automobiles took 60 to 70 per cent of all zinc diecastings and '56 models are carrying about 10 to 15 per cent more zinc than the 1955's.

Continued government purchase of lead will help keep the market strong. The current price of 15½-cents per pound is bringing adequate supplies to meet the expected high-level demand for this country and abroad.

Tin . . .

Tin prices will remain at present high levels for most of the first quarter, but the outlook for all of '56 is for more than enough tin to satisfy market requirements. Reason: There will be some 23,000 tons of tin on the open market which have been going into government stockpile.

Titanium . . .

The titanium industry is on the move. After showing no gains in 1954, dollar value of mill products for 1955 is estimated at $60 million. Sponge metal sales add an additional $30 million to the total.

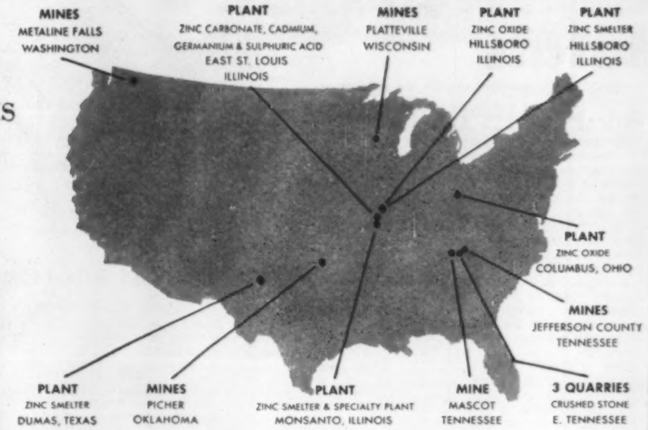
For 1956, dollar value of mill products is expected to exceed $120 million, and sponge may account for more than $40 million. Production of mill shapes is estimated at 2000 tons for 1955. This is a 60-per-cent jump over '54 totals. Government statistics show that 1956 requirements for mill products will be somewhere near the 4000-to-4500-ton mark. This means fabricators will have to more than double 1955 production.

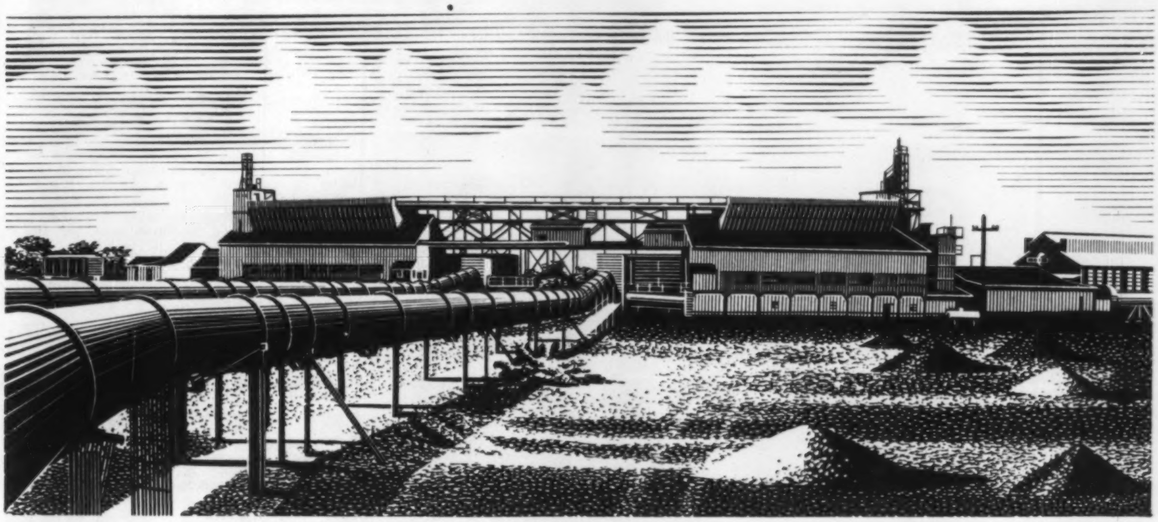
Magnesium . . .

Some 14,040 tons of castings and 10,521 tons of wrought products were consumed during 1955. In 1954, 12,767 tons of castings and 6946 tons of wrought products were produced. Bright spot for the coming year will be the increased use of hot-chamber diecasting. Reason: By using this method, magnesium can compete in cost with zinc and aluminum. Magnesium advocates feel that this will be an opening wedge in their drive to develop new and expanded markets.

American Zinc and its products

from A to Z


MINES
METALINE FALLS
WASHINGTON
PLANT
ZINC CARBONATE, CADMIUM,
GERMANIUM & SULPHURIC ACID
EAST ST. LOUIS
ILLINOIS
MINES
PLATTEVILLE
WISCONSIN
PLANT
ZINC OXIDE
HILLSBORO
ILLINOIS
PLANT
ZINC SMELTER
HILLSBORO
ILLINOIS
PLANT
ZINC OXIDE
COLUMBUS, OHIO
MINES
JEFFERSON COUNTY
TENNESSEE
PLANT
ZINC SMELTER
DUMAS, TEXAS
MINES
PICHER
OKLAHOMA
PLANT
ZINC SMELTER & SPECIALTY PLANT
MONSANTO, ILLINOIS
MINE
MASCOT
TENNESSEE
3 QUARRIES
CRUSHED STONE
E. TENNESSEE



DUAL OPERATION AT HILLSBORO, ILLINOIS

(1) The Oxide Division supplies American process lead-free and leaded zinc oxide, as well as French process zinc oxide. (2) In the Metal Division, Prime Western, Select, Brass Special, Intermediate and High Grade slab zinc are produced. For complete picture of American Zinc operations, see map above.

PRODUCERS OF

ALL GRADES OF SLAB ZINC
ZINC ANODES (Plating & Galvanic)
METALLIC CADMIUM
SULPHURIC ACID
LEAD-FREE and LEADED ZINC OXIDES
ZINC CARBONATE
GERMANIUM DIOXIDE
AGRICULTURAL LIMESTONE
CRUSHED STONE

American Zinc sales Company

Distributors for AMERICAN ZINC, LEAD & SMELTING COMPANY

Columbus, Ohio • Chicago • St. Louis • New York • Detroit • Pittsburgh

Nonferrous Metals

Cents per pound, carlots, except as otherwise noted.

PRIMARY METALS AND ALLOYS

Aluminum: 99 + %, ingots 24.40, pigs 22.50. 10,000 lb or more, f.o.b. shipping point. Freight allowed on 500 lb or more.

Aluminum Alloy: No. 13, 12% Si, 26.20; No. 43, 5% Si, 26.00; No. 142, 4% Cu, 1.5% Mg, 2% Ni, 28.20; No. 195, 4.5% Cu, 0.8% Si, 27.60; No. 214, 3.8% Mg, 27.80; No. 356, 7% Si, 0.3% Mg, 26.20.

Antimony: R.M.M. brand, 99.5%, 33.00, Lone Star brand, 33.50, f.o.b. Laredo, Tex., in bulk. Foreign brands, 99.5%, 27.00-28.00, New York, duty paid, 10,000 lb or more.

Beryllium: 97%, lump or beads, $71.50 per lb, f.o.b. Cleveland or Reading, Pa.

Beryllium Aluminum: 5% Be, $72.75 per lb of contained Be, f.o.b. Reading, Pa., Elmore, O.

Beryllium Copper: 3.75-4.25% Be, $43 per lb of contained Be, with balance as Cu at market price on shipment date, f.o.b. Reading, Pa. or Elmore, O.

Bismuth: $2.25 per lb ton lots.

Cadmium: Sticks and bars $1.70 per lb, deld.

Cobalt: 97-99%, $2.60 per lb for 550-lb keg; $2.62 per lb for 100-lb case; $2.67 per lb under 100 lb.

Columbium: Powder, $119.20 per lb, nom.

Copper: Electrolytic, 43.00 deld. Conn. Valley; 43.00 deld. Midwest: custom smelters, 50.00 deld.; Lake, 43.00 deld.; Fire refined, 42.75 deld.

Germanium: 99.9%, $295 per lb, nom.

Gold: U. S. Treasury, $35 per oz.

Indium: 99.9%, $2.25 per troy oz.

Iridium: $100-$120 nom, per troy oz.

Lead: Common, 15.30, chemical, 15.40, corroding, 15.40, St. Louis, New York basis, add 0.20.

Lithium: 99%+, cups or ingot, $11.50; rod $13.50; shot or wire, $14.50, f.o.b. Minneapolis, 100 lb lots.

Magnesium: 99.8% self-palletizing pig, 32.50; notched ingot, 32.25, 10,000 lb or more, f.o.b. Freeport, Tex. For Port Newark, N. J., add 1.40 for pig and 1.45 for ingot; for Madison, Ill., add 1.20 for pig and 1.25 for ingot; for Los Angeles, add 2.00 for both pig and ingot. Sticks 1.3 in. diameter, 53.00, 100 to 4999 lb, f.o.b. Madison, Ill.

Magnesium Alloys: AZ91C and alloys C, G, H and R, 36.00; alloy M, 38.00, 10,000 lb or more, f.o.b. Freeport, Tex. For Port Newark, N. J., add 1.40; for Madison, Ill., add 0.50; for Los Angeles, add 2.50.

Mercury: Open market, spot, New York, $280-$285 per 76-lb flask.

Molybdenum: Powder 99% hydrogen reduced, $3-$3.35 per lb; pressed ingot, $4.06 per lb; sintered ingot, $5.53 per lb.

Nickel: Electrolytic cathodes, sheets (4 x 4 in. and larger), unpacked, 64.50; 10-lb pigs, unpacked, 67.65; "XX" nickel shot, 69.00; "F" nickel shot or ingots for addition to cast iron, 64.50; prices f.o.b. Port Colborne, Ont., including import duty. New York basis, add 0.92.

Osmium: $80-$100, nom, per troy oz.

Palladium: $22-$24 per troy oz.

Platinum: $97-$117 per troy oz from refineries.

Radium: $16-$21.50 per mg radium content, depending on quantity.

Rhodium: $118-$125 per troy oz.

Ruthenium: $45-$55 per troy oz.

Selenium: 99.5%, $9-$10 per lb.

Silver: Open market, 90.50 per troy oz.

Sodium: 16.50, c.l.; 17.00 l.c.l.

Tantalum: Sheet, rod, $68.70 per lb; powder, $56.63 per lb.

Tellurium: $1.75 per lb.

Thallium: $12.50 per lb.

Tin: Straits, N. Y., spot, 109.375; prompt, 108.75.

Titanium: Sponge, 99.3+%, grade A-1 ductile (0.3% Fe max), $3.45, grade A-2 (0.5% Fe max), $3.15 per pound.

Tungsten: Powder, 98.8%, carbon reduced, 1000-lb lots, $4.50 per lb, nom., f.o.b. shipping point; less than 1000 lb add 15.00; 99 + % hydrogen reduced $5.00. Treated ingots, $6.70.

Zinc: Prime Western, 13.00; brass special, 13.25; intermediate, 13.50, East St. Louis, freight allowed over 0.50 per pound. High grade, 14.35; special high grade 14.75, deld. Diecasting alloy ingot No. 3, 17.50; No. 2, 18.50; No. 5, 18.00, deld.

Zirconium: Ingots, commercial grade, $14.40 per lb; low-hafnium reactor grade, $23.07. Sponge, commercial grade, $7.50-$10.00 per lb, depending on quantity; reactor grade, $14.00-$22.00 per lb, depending on quantity. Powder, electronics grade, $15 per lb; flash grade, $11.50.

(Note: Chromium, manganese and silicon metals are listed in ferroalloy section.)

SECONDARY METALS AND ALLOYS

Aluminum Ingot: Piston alloys, 33.00-34.75; No. 12 foundry alloy (No. 2 grade) 32.00-32.25; 5% silicon alloy, 0.60 Cu max, 33.50-33.75; 13 alloy, 0.60 Cu max, 33.50-33.75; 195 alloy, 33.75; 108 alloy, 31.50-32.00. Steel deoxidizing grades notch bars, granulated or shot: Grade 1, 31.50-32.75; grade 2, 30.50-31.75; grade 3, 29.75-31.00; grade 4, 29.25-30.50.

Brass Ingot: Red brass No. 115, 42.00; tin bronze No. 225, 56.00; No. 245, 48.75; high-leaded tin bronze No. 305, 45.75; No. 1 yellow No. 405, 33.25; manganese bronze No. 421, 37.75.

Magnesium Alloy Ingot: AZ63A, 34.00; AZ91B, 34.00; AZ91C, 34.00; AZ92A, 34.00.

NONFERROUS MILL PRODUCTS

BERYLLIUM COPPER

(Base prices per lb, plus mill extras, 2000 to 5000 lb, f.o.b. Temple, Pa.; nominal 1.9% Be alloy) Strip, $1.84; rod, bar, wire, $1.81.

COPPER WIRE

Bare, soft, f.o.b. eastern mills, 100,000-lb lots, 48.35; 30,000-lb lots 48.88; l.c.l., 48.98. Weatherproof, 100,000-lb lots, 46.03; 30,000-lb lots, 46.28; l.c.l. 46.78. Magnetic wire deld., 15,000 lb or more, 55.52; l.c.l., 56.27.

LEAD

(Prices to jobbers, f.o.b. Buffalo, Cleveland, Pittsburgh) Sheets, full rolls, 140 sq ft or more, $21 per cwt; pipe, full coils, $21 per cwt; traps and bends, list prices plus 30%.

TITANIUM

(Prices per lb, 10,000 lb and over, f.o.b. mill) Sheets, $13.10-$13.60; sheared mill plate, $10.50-$12.00; strip, $13.10-$13.60; wire, $9.50-$11.50; forging billets, $7.90-$8.15; hot-rolled and forged bars, $7.90-$8.15.

ZINC

(Prices per lb, c.l., f.o.b. mill) Sheets, 23.00; ribbon zinc in coils, 20.50; plates 19.50-22.25.

ZIRCONIUM

Plate, $22; H.R. strip, $19; C.R. strip, $29; forged or H.R. bars, $17; wire, 0.015 in., 1.00c per linear foot.

NICKEL MONEL, INCONEL

	"A" Nickel	Monel	Inconel
Sheets, C.R.	102	83	99
Strip, C.R.	102	92	125
Plate, H.R.	97	87	95
Rod, Shapes, H.R.	87	74	93
Seamless Tubes	122	110	153
Shot, Blocks	...	71	...

ALUMINUM

Screw Machine Stock: 30,000 lb base.

Diam. (in.) or across flats	Round 2011-T3	Round 2017-T4	Hexagonal 2011-T3	Hexagonal 2017-T4
Drawn				
0.125	67.9	66.4	...	...
0.156-0.172	57.5	55.9	...	...
0.188	57.5	55.9	...	71.7
0.219-0.234	54.5	52.9	...	...
0.250-0.281	54.5	52.9	...	68.4
0.313	54.5	52.9	...	65.2
Cold-finished				
0.375-0.547	53.4	51.4	63.7	61.3
0.563-0.688	53.4	51.4	60.6	57.5
0.750-1.000	52.1	50.1	55.4	54.2
1.063	52.1	50.1	...	52.3
1.125-1.500	50.1	48.2	53.6	52.3
Rolled				
1.563	48.8	46.9	...	...
1.625-2.000	48.2	46.2	...	50.5
2.125-2.500	47.0	45.0	...	...
2.563-3.375	45.6	43.6	...	...

ALUMINUM

Sheet and Circles: 1100 and 3003 mill finish (30,000 lb base; freight allowed)

Thickness Range Inches	Flat Sheet	Flat Sheet Circles*	Coiled Sheet	Coiled Sheet Circle†
0.249-0.136	37.5	42.3	...	...
0.135-0.096	38.0	43.2	...	...
0.095-0.077	38.7	44.2	36.1	41.3
0.076-0.061	39.3	45.1	36.3	41.5
0.060-0.048	39.9	45.6	36.7	42.0
0.047-0.038	40.4	46.5	37.2	42.4
0.037-0.030	40.8	47.0	37.6	43.1
0.029-0.024	41.4	47.5	37.9	43.6
0.023-0.019	42.2	49.0	38.8	44.5
0.018-0.017	43.0	...	39.4	45.4
0.016-0.015	43.9	...	40.2	46.6
0.014	44.9	...	41.2	47.9
0.013-0.012	46.1	...	41.9	48.9
0.011	47.1	...	43.1	50.5
0.010-0.0095	48.4	...	44.3	52.2
0.009-0.0085	49.7	...	45.8	54.3
0.008-0.0075	51.3	...	47.0	56.1
0.007	52.8	...	48.5	58.4
0.006	54.4	...	49.9	63.4

*48 in. max diam. †26 in. max diam.

ALUMINUM

Plates and Circles: Thickness 0.250-3 in., 24-60 in. width or diam, 72-240 in. lengths.

Alloy	Plate Base	Circle Base
1100-F, 3003-F	36.5	40.8
5050-F	37.6	41.9
3004-F	38.6	43.8
5052-F	39.9	45.2
6061-T6	41.1	46.0
2024-T4*	43.6	49.9
7075-T6*	51.4	58.5

*24-48 in. widths or diam, 72-180 lengths.

ALUMINUM

Forging Stock: Round, Class 1, 39.10-50.10 in specific lengths 36-144 in., diameters 0.375-8 in. Rectangles and squares, Class 1, 43.00-56.20 in random lengths, 0.375-4 in. thick, widths 0.750-10 in.

Pipe: ASA Schedule 40, alloy 6063-T6, 20-ft lengths, plain ends, 90,000-lb base, per 100 ft.

Nom. Pipe Size (in.)		Nom. Pipe Size (in.)	
¾	$16.85	2	$ 51.95
1	26.50	4	143.00
1¼	35.85	6	256.70
1½	42.90	8	386.30

MAGNESIUM

Sheet: AZ31, commercial grade, 0.032 in., 99.00; 0.064 in., 78.00; 0.125 in., 63.50, 30,000 lb and over, f.o.b. mill.

Plate: AZ31, 61.00, 30,000 lb or more, 0.250 in. and over, widths 24-60 in., lengths 72-180 in., tread plate, 64.00, 30,000 lb or more, ¼-in. thick, widths 24-60 in., lengths 60-192 in.; tooling plate 66.00. 30,000 lb or more, 0.250-3.000 in., widths 60-72 in., lengths 72-180 in.

Extrusions: AZ31 commercial grade, rectangels, ¼ x 2 in., 64.70; 1 x 4 in., 69.50. Rod, 1 in., 61.50; 2 in., 59.00. Tubing, 1 in. OD x 0.065 in., 82.50. Angles, 1 x 1 x ⅛-in., 68.40; 2 x 2 x ¼-in., 62.50. Channels, 5 in., 63.40. I-beams, 5 in., 62.70.

NONFERROUS SCRAP

DEALER'S BUYING PRICES

(Cents per pound, New York, in ton lots)

Aluminum: 1100 clippings, 20.00-20.50; old sheets 17.00-17.50; borings and turnings, 11.50-12.00; crankcases, 17.00-17.50; industrial castings 17.00-17.50.

Copper and Brass: No. 1 heavy copper and wire 41.50-42.00; No. 2 heavy copper and wire, 37.50-38.50; light copper, 35.50-36.00; No. 1 composition red brass 32.00-32.50; No. 1 composition turnings, 31.00-31.50; yellow

BRASS MILL PRICES

	MILL PRODUCTS a				SCRAP ALLOWANCES f		
	Sheet, Strip, Plate	Rod	Wire	Seamless Tube	Clean Heavy	Rod Ends	Clean Turnings
Copper	63.13b	60.36c	....	63.32	39.000	39.000	38.250
Yellow Brass	52.27	42.41d	52.81	55.18	28.875	28.625	26.750
Red Brass, 85%	58.09	58.03	58.63	60.90	34.250	34.000	33.500
Low Brass, 80%	56.55	56.49	57.09	59.36	32.750	32.500	32.000
Naval Brass	55.63	49.94	62.69	58.79	26.750	26.500	26.000
Com. Bronze, 90%	60.18	60.12	60.72	62.74	35.750	35.500	35.000
Nickel Silver, 10%	66.00	68.33g	68.33	....	32.500	32.250	16.250
Phos. Bronze, A, 5%	80.99	81.49	81.49	82.67	39.250	39.000	38.000
Silicon Bronze	66.54	65.73	66.58	68.68e	37.875	37.625	37.875
Manganese Bronze	59.37	53.38	63.82	....	27.000	26.750	26.000
Muntz Metal	53.74	49.55	....	....	27.000	26.750	26.250

a. Cents per lb, f.o.b. mill; freight allowed on 500 lb or more. b. Hot-rolled. c. Cold-drawn. d. Free cutting. e. 3% silicon. f. Prices in cents per lb for less than 20,000 lb, f.o.b. shipping point. On lots over 20,000 lb at one time, of any or all kinds of scrap, add 1 cent per lb. g. Leaded.

brass turnings, 17.50-18.00; new brass clippings, 27.50-28.00; light brass, 19.00-19.50; heavy yellow brass, 22.00-22.50; new brass rod ends, 26.00-26.50; auto radiators, unsweated, 24.50-25.00; cocks and faucets, 24.50-25.00; brass pipe 25.00-25.50.

Lead: Heavy, 12.00-12.50; battery plates, 6.50-6.75; linotype and stereotype, 13.25-14.25; electrotype, 12.00-12.75; mixed babbitt, 14.50.

Magnesium: Clippings, 18.50-19.50; clean castings, 18.00-19.00; iron castings, not over 10% removable Fe, less full deduction for Fe, 16.00-17.00.

Monel: Clippings, 54.50-65.00; old sheets, 50.00-65.00; turnings, 44.00; rods, 54.50-65.00.

Nickel: Sheets and clips, 90.00-125.00; rolled anodes, 90.00-125.00; turnings, 75.00-100.00; rod ends, 90.00-125.00.

Zinc: Old zinc, 5.50-6.00; new die-cast scrap, 5.00-5.75; old die-cast scrap, 3.25-3.50.

REFINER'S BUYING PRICES

(Cents per pound, carlots, delivered refinery)

Aluminum: 1100 clippings, 24.00-25.00; 3003 clippings, 24.75-25.00; 6151 clippings, 24.50-25.00; 5052 clippings, 24.50-25.00; 2014 clippings, 24.00-24.50; 2017 clippings, 24.00-24.50; 2024 clippings, 24.00-24.50; mixed clippings, 24.00-24.50; old sheet, 20.00-22.00; old cast, 21.00-22.00; clean old cable (free of steel), 25.00; borings and turnings, 22.50-23.00.

Beryllium Copper: Heavy scrap, 0.020-in. and heavier, not less than 1.5% Be, 54.00; light scrap, 49.00; turnings and borings, 39.00.

Copper and Brass: No. 1 heavy copper and wire, 43.00; No. 2 heavy copper and wire, 41.50; light copper, 39.00; refinery brass (60% copper) per dry copper content, 39.00.

INGOTMAKERS' BUYING PRICES

(Cents per pound, carlots, delivered)

Copper and Brass: No. 1 heavy copper and wire, 44.00; No. 2 heavy copper and wire, 41.50; light copper, 39.00; No. 1 composition borings 34.00; No. 1 composition solids, 35.00; heavy yellow brass solids, 24.00; yellow brass turnings, 23.00; radiators, 27.50.

PLATING MATERIAL

(F.o.b. shipping point, freight allowed on quantities)

ANODES

Cadmium: Special or patented shapes, $1.70 per lb.

Copper: Flat-rolled, 59.79, oval, 58.92, 5000-10,000 lb; electrodeposited, 54.28, 2000-5000 lb lots; cast 59.54, 5000-10,000 lb quantities.

Nickel: Depolarized, less than 100 lb, $1.015; 100-499 lb, 99.50; 500-4999 lb, 95.50; 5000-29,999 lb, 93.50; 30,000 lb, 91.50. Carbonized, deduct 3 cents a lb. All prices eastern delivery effective Jan. 1, 1955.

Tin: Bar or slab, less than 200 lb, $1.275; 200-499 lb, $1.260; 500-999 lb, $1.255; 1000 lb or more, $1.250.

Zinc: Balls, 21.00; flat tops, 21.00; flats, 22.75; ovals, 22.00, ton lots.

CHEMICALS

Cadmium Oxide: $2.15 per lb, in 100-lb drums.
Chromic Acid: Less than 10,000 lb, 28.50; over 10,000 lb, 27.50.

Copper Cyanide: 100 lb, 85.25; 200 lb, 84.50; 300 lb, 84.25; 400-900 lb, 85.50; 1000 lb, 81.50.
Copper Sulphate: 500-1900 lb, 17.90; 2000-5900 lb, 15.90; 6000 lb or more, 15.65.

Nickel Chloride: 100 lb, 46.50; 200 lb, 44.50; 300 lb, 35.25; 400-4900 lb, 33.25; 5000-35,900 lb, 39.50; 10,000 lb and over, 38.50. All prices eastern delivery, effective Jan. 1, 1955.

Nickel Sulphate: 100 lb, 38.25; 200 lb, 36.25; 3300 lb, 35.25; 400-4900 lb, 33.25; 5000-35,900 lb, 31.25; 36,000 lb, 30.25. All prices eastern delivery, effective Jan. 1, 1955.

Silver Cyanide: (Cents per ounce) 4-oz bottle, 86.875; 16-oz bottle, 85.625; 80-oz bottle, 83.125; 100-oz bottle, 83.125; f.o.b. St. Louis, New York and Los Angeles. Effective Sept. 30, 1955.

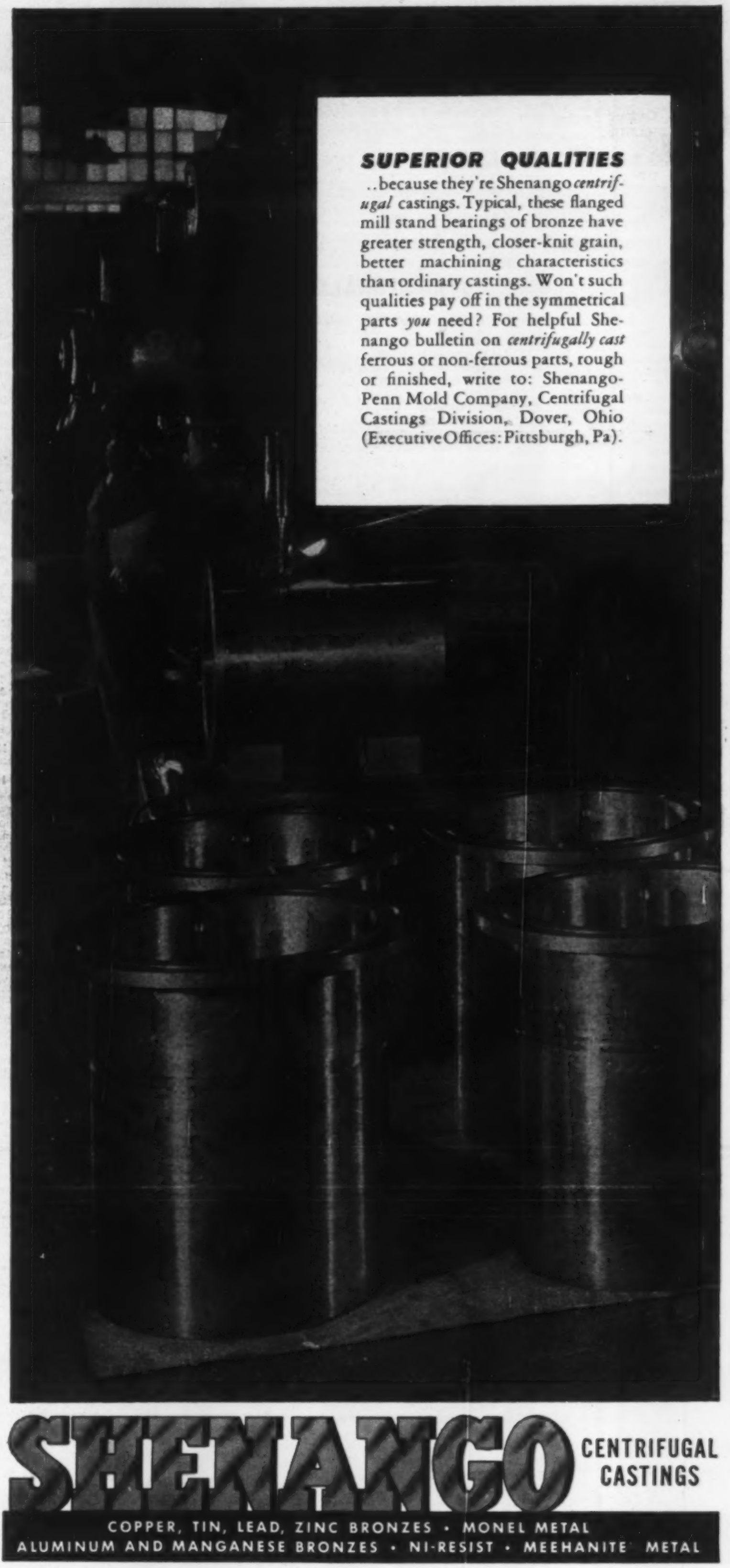
Sodium Cyanide: Egg, under 1000 lb, 19.80; 1000-19,900 lb, 18.80; 20,000 lb and over, 17.80; granular, add 1-cent premium to above.

Sodium Stannate: Less than 100 lb, 75.80; 100-600 lb, 67.00; 700-1900 lb, 64.50; 2000-9900 lb, 62.80; 10,000 lb or more, 61.60.

Stannous Chloride (anhydrous): Less than 25 lb, $1.738; 25 lb, $1.388; 100 lb, $1.238; 400 lb, $1.214; 5200-19,600 lb, $1.092; 20,000 lb or more, 97.00.

Stannous Sulphate: Less than 50 lb, $1.362; 50 lb, $1.062; 100-1900 lb, $1.042; 2000 lb or more, $1.022.

Zinc Cyanide: Under 1000 lb, 54.30; 1000 lb and over, 52.30.



SUPERIOR QUALITIES

..because they're Shenango *centrifugal* castings. Typical, these flanged mill stand bearings of bronze have greater strength, closer-knit grain, better machining characteristics than ordinary castings. Won't such qualities pay off in the symmetrical parts *you* need? For helpful Shenango bulletin on *centrifugally cast* ferrous or non-ferrous parts, rough or finished, write to: Shenango-Penn Mold Company, Centrifugal Castings Division, Dover, Ohio (Executive Offices: Pittsburgh, Pa).

SHENANGO CENTRIFUGAL CASTINGS

COPPER, TIN, LEAD, ZINC BRONZES • MONEL METAL
ALUMINUM AND MANGANESE BRONZES • NI-RESIST • MEEHANITE METAL

Steel Prices

Mill prices as reported to STEEL, cents per pound except as otherwise noted. *Changes shown in italics.* Code numbers following mill points indicate producing company. Key on page 467. Key to footnotes, Page 469.

SEMIFINISHED

INGOTS, Carbon, Forging (NT)

Munhall,Pa. U5	$65.50

INGOTS, Alloy (NT)

Detroit R7	$69.00
Houston S5	74.00
Midland,Pa. C18	69.00
Munhall,Pa. U5	69.00

BILLETS BLOOMS & SLABS

Carbon, Rerolling (NT)

Aliquippa,Pa. J5	$68.50
Bessemer,Pa. U5	68.50
Bridgeport,Conn. N19	73.50
Buffalo R2	68.50
Clairton,Pa. U5	68.50
Ensley,Ala. T2	68.50
Fairfield,Ala. T2	68.50
Fontana,Calif. K1	76.00
Gary,Ind. U5	68.50
Johnstown,Pa. B2	68.50
Lackawanna,N.Y. B2	68.50
LoneStar,Tex. L6	74.50
Munhall,Pa. U5	68.50
Pittsburgh J5	68.50
S.Chicago,Ill R2 U5	68.50
S.Duquesne,Pa. U5	68.50
Youngstown R2	68.50

Carbon, Forging (NT)

Aliquippa,Pa. J5	$84.50
Bessemer,Pa. U5	84.50
Bridgeport,Conn. N19	89.50
Buffalo R2	84.50
Canton,O. R2	86.50
Clairton,Pa. U5	84.50
Conshohocken,Pa. A3	89.50
Ensley,Ala. T2	84.50
Fairfield,Ala. T2	84.50
Fontana,Calif. K1	92.00
Gary,Ind. U5	84.50
Geneva,Utah C11	84.50
Houston S5	89.50
Johnstown,Pa. B2	84.50
Lackawanna,N.Y. B2	84.50
LosAngeles B3	94.00
Midland,Pa. C18	84.50
Munhall,Pa. U5	84.50
Pittsburgh J5	84.50
Seattle B3	98.00
S.Chicago R2,U5,W14	84.50
S.Duquesne,Pa. U5	84.50
S.SanFrancisco B3	94.00

Alloy, Forging (NT)

Bethlehem,Pa. B2	$96.00
Buffalo R2	96.00
Canton,O. R2, T7	96.00
Conshohocken,Pa. A3	103.00
Detroit R7	96.00
Fontana,Calif. K1	115.00
Gary,Ind. U5	96.00
Houston S5	101.00
Ind.Harbor,Ind. Y1	96.00
Johnstown,Pa. B2	96.00
Lackawanna,N.Y. B2	96.00
LosAngeles B3	116.00
Massillon,O. R2	96.00
Midland,Pa. C18	96.00
Munhall,Pa. U5	96.00
S.Chicago R2,U5,W14	96.00
S.Duquesne,Pa. U5	96.00
Struthers,O. Y1	96.00
Warren,O. C17	96.00

ROUNDS, SEAMLESS TUBE (NT)

Buffalo R2	$103.50
Canton,O. R2	103.50
Cleveland R2	103.50
Gary,Ind. U5	103.50
S.Chicago R2,W14	103.50
S.Duquesne,Pa. U5	103.50

SKELP

Aliquippa,Pa. J5	4.325
LoneStar,Tex. L6	4.625
Munhall,Pa. U5	4.225
SparrowsPoint,Md. B2	4.225
Warren,O. R2	4.225
YoungstownR2, U5	4.225

WIRE RODS

AlabamaCity,Ala. R2	5.025
Aliquippa,Pa. J5	5.025
Alton,Ill L1	5.20
Buffalo B11, W12	5.025
Cleveland A7	5.025
Donora,Pa. A7	5.025
Fairfield,Ala. T2	5.025
Houston S5	5.275
IndianaHarbor,Ind. Y1	5.025
Johnstown,Pa. B2	5.025
Joliet,Ill. A7	5.025
KansasCity,Mo. S5	5.275
Kokomo,Ind. C16	5.125
LosAngeles B3	5.825
Minnequa,Colo. C10	5.275
Monessen,Pa. P7	5.025
N.Tonawanda,N.Y. B11	5.025
Pittsburg,Calif. C11	5.675
Portsmouth,O. P12	5.025
Roebling,N.J. R5	5.125
S.Chicago,Ill R2	5.025
SparrowsPoint,Md. B2	5.125
Sterling,Ill.(1) N15	5.025
Sterling,Ill. N15	5.125
Struthers,O. Y1	5.025
Worcester,Mass. A7	5.325

STRUCTURALS

Carbon Steel Std. Shapes

Ala.City,Ala. R2	4.60
Aliquippa,Pa. J5	4.60
Bessemer,Ala. T2	4.60
Bethlehem,Pa. B2	4.65
Birmingham C15	5.10
Clairton,Pa. U5	4.60
Fairfield,Ala. T2	4.60
Fontana,Calif. K1	5.25
Gary,Ind. U5	4.60
Geneva,Utah C11	4.60
Houston S5	4.70
Ind.Harbor,Ind. I-2	4.60
Johnstown,Pa. B2	4.65
KansasCity, Mo. S5	4.70
Lackawanna,N.Y. B2	4.65
LosAngeles B3	5.30
Minnequa,Colo. C10	4.90
Munhall,Pa. U5	4.60
Niles,Calif. P1	5.25
Portland,Oreg. O4	5.35
Phoenixville,Pa. P4	5.15
Seattle B3	5.35
S.Chicago U5, W14	4.60
S.SanFrancisco B3	5.25
Torrance,Calif. C11	5.30
Weirton,W.Va. W6	4.60

Wide Flange

Bethlehem,Pa. B2	4.65
Clairton,Pa. U5	4.60
Fontana,Calif. K1	5.40
Lackawanna,N.Y. B2	4.65
Munhall,Pa. U5	4.60
Phoenixville,Pa. P4	5.15
S.Chicago,Ill. U5	4.60

Alloy Std. Shapes

Clairton,Pa. U5	5.65
Fontana,Calif. K1	7.30
Gary,Ind. U5	5.65
Houston S5	5.75
Munhall,Pa. U5	5.65
S.Chicago,Ill. U5	5.65

H.S., L.A. Std. Shapes

Aliquippa,Pa. J5	6.75
Bessemer,Ala. T2	6.75
Bethlehem,Pa. B2	6.80
Clairton,Pa. U5	6.75
Fairfield,Ala. T2	6.75
Fontana,Calif. K1	7.40
Gary,Ind. U5	6.75
Geneva,Utah C11	6.75
Houston S5	6.85
Ind.Harbor,Ind. I-2, Y1	6.75
Johnstown,Pa. B2	6.80
KansasCity,Mo. S5	6.85
Lackawanna,N.Y. B2	6.80
LosAngeles B3	7.45
Munhall,Pa. U5	6.75
Seattle B3	7.50
S.Chicago,Ill. U5, W14	6.75
S.SanFrancisco B3	7.40
Struthers,O. Y1	6.75

H.S., L.A. Wide Flange

Bethlehem,Pa. B2	6.80
Lackawanna,N.Y. B2	6.80
Munhall,Pa. U5	6.75
S.Chicago,Ill U5	6.75

PILING

BEARING PILES

Bethlehem,Pa. B2	4.65
Lackawanna,N.Y. B2	4.65
Munhall,Pa. U5	4.60
S.Chicago,Ill. U5	4.60

STEEL SHEET PILING

Ind.Harbor,Ind. I-2	5.45
Lackawanna,N.Y. B2	5.45
Munhall,Pa. U5	5.45
S.Chicago,Ill. U5	5.45

PLATES

PLATES, Carbon Steel

Ala.City,Ala. R2	4.50
Aliquippa,Pa. J5	4.50
Ashland,Ky.(15) A10	4.50
Bessemer,Ala. T2	4.50
Bridgeport,Conn. N19	4.75
Buffalo R2	4.50
Clairton,Pa. U5	4.50
Claymont,Del. C22	4.80
Cleveland J5, R2	4.60
Coatesville,Pa. L7	4.80
Conshohocken,Pa. A3	4.50
Detroit M1	4.60
Ecorse,Mich. G5	4.60
Fairfield,Ala. T2	4.50
Fontana,Calif.(30) K1	5.15
Gary,Ind. U5	4.50
Geneva,Utah C11	4.50
GraniteCity,Ill. G4	4.70
Harrisburg,Pa. P4	5.10
Houston S5	4.60
Ind.Harbor,Ind. I-2, Y1	4.50
Johnstown,Pa. B2	4.50
Lackawanna,N.Y. B2	4.50
LoneStar,Tex. L6	4.85
Mansfield,O. E6	4.50
Minnequa,Colo. C10	5.35
Munhall,Pa. U5	4.50
Newport,Ky. N9	4.50
Pittsburgh J5	4.50
Riverdale,Ill. A1	4.725
Seattle B3	5.40
Sharon,Pa. S3	4.50
S.Chicago R2, U5, W14	4.50
SparrowsPoint,Md. B2	4.50
Steubenville,O. W10	4.50
Warren,O. R2	4.50
Weirton,W.Va. W6	4.50
Youngstown R2, U5, Y1	4.50

PLATES, Carbon Abras. Resist.

Claymont,Del. C22	5.65
Fontana,Calif. K1	6.30
Geneva,Utah C11	5.65
Johnstown.Pa. B2	5.65
SparrowsPoint,Md. B2	5.65

PLATES, Wrought Iron

Economy,Pa. B14	10.40

PLATES,High-Strength Low-Alloy

Aliquippa,Pa. J5	6.725
Bessemer.Ala. T2	6.725
Clairton,Pa. U5	6.725
Cleveland J5, R2	6.725
Claymont,Del. C22	6.725
Coatesville,Pa L7	7.025
Conshohocken,Pa. A3	6.725
Ecorse,Mich. G5	6.825
Fairfield,Ala. T2	6.725
Fontana,Calif.(30) K1	7.375
Gary,Ind. U5	6.725
Geneva,Utah C11	6.725
Houston S5	6.825
Ind.Harbor,Ind. I-2, Y1	6.725
Johnstown,Pa. B2	6.725
Munhall.Pa. U5	6.725
Pittsburgh J5	6.725
Seattle B3	7.625
Sharon,Pa. S3	6.725
S.Chicago.Ill. U5, W14	6.725
SparrowsPoint,Md. B2	6.725
Youngstown U5, Y1	6.725

PLATES, Alloy

Bridgeport,Conn. N19	6.55
Claymont,Del. C22	6.30
Coatesville,Pa. L7	6.30
Fontana,Calif. K1	6.95
Gary,Ind. U5	6.30
Houston S5	6.40
Ind.Harbor,Ind. Y1	6.30
Johnstown,Pa. B2	6.30
Munhall,Pa. U5	6.30
Newport,Ky. N9	6.30
Seattle B3	7.20
Sharon,Pa. S3	6.30
S.Chicago.Ill. U5, W14	6.30
SparrowsPoint,Md. B2	6.30
Youngstown Y1	6.30

FLOOR PLATES

Cleveland J5	5.575
Conshohocken,Pa. A3	5.575
Harrisburg,Pa. P4	5.575
Ind.Harbor,Ind. I-2	5.575
Munhall,Pa. U5	5.575
S.Chicago,Ill. U5	5.575

PLATES, Ingot Iron

Ashland c.l. (15) A10	4.75
Ashland l.c.l. (15) A10	5.25
Cleveland c.l R2	5.10
Warren,O. c.l. R2	5.10

BARS

BARS, Hot-Rolled Carbon

Ala.City,Ala. R2	4.65
Aliquippa,Pa. J5	4.65
Alton, Ill. L1	4.85
Atlanta A11	4.85
Bessemer,Ala.(9) T2	4.65
Birmingham C15	5.15
Bridgeport,Conn. N19	4.80
Buffalo R2	4.65
Canton,O. R2	4.75
Clairton,Pa.(9) U5	4.65
Cleveland R2	4.65
Ecorse,Mich. G5	4.75
Emeryville,Calif. J7	5.40
Fairfield.Ala.(9) T2	4.65
FairlessHills,Pa.(9) U5	4.80
Fontana,Calif. K1	5.35
Gary,Ind.(9) U5	4.65
Houston S5	4.90
Ind.Harbor,Ind. I-2, Y1	4.65
Johnstown,Pa. B2	4.65
Joliet,Ill. P22	5.15
KansasCity,Mo. S5	4.90
Lackawanna,N.Y. B2	4.65
LosAngeles B3	5.35
Massillon,O. R2	4.75
Midland,Pa. C18	4.65
Milton,Pa. M18	4.65
Minnequa,Colo. C10	5.10
Niles,Calif. P1	5.35
N.Tonawanda,N.Y. B11	4.65
Pittsburg.Calif.(9) C11	5.35
Pittsburgh J5	4.65
Portland,Oreg. O4	5.40
Seattle B3, N14	5.40
S.Chicago R2, W14	4.65
S.Chicago,Ill.(9) U5	4.65
S.Duquesne,Pa.(9) U5	4.65
S.SanFran.,Calif. B3	5.40
Sterling,Ill.(1) N15	4.65
Sterling,Ill. N15	4.75
Struthers,O. Y1	4.65
Torrance.Calif.(9) C11	5.35
Warren,O. R2	4.65
Weirton,W.Va. W6	4.65
Youngstown R2	4.65
Youngstown(9) U5	4.65

BARS, H.R. Leaded Alloy

Warren,O. C17	6.325

BARS, Hot-Rolled Alloy

Bethlehem,Pa. B2	5.575
Bridgeport,Conn. N19	5.725
Buffalo R2	5.575
Canton,O. R2, T7	5.575
Clairton,Pa. U5	5.575
Detroit R7	5.575
Ecorse,Mich. G5	5.675
Fontana,Calif. K1	6.625
FairlessHills,Pa. U5	5.725
Gary,Ind. U5	5.575
Houston S5	5.825
Ind.Harbor.Ind. I-2, Y1	5.575
Johnstown,Pa. B2	5.575
KansasCity,Mo. S5	5.825
Lackawanna,N.Y. B2	5.575
LosAngeles B3	6.625
Massillon,O. R2	5.575
Midland,Pa. C18	5.575
S.Chicago R2, U5, W14	5.575
S.Duquesne,Pa. U5	5.575
Struthers,O. Y1	5.575
Warren,O. C17	5.575
Youngstown U5	5.575

BARS & SMALL SHAPES, H.R. High-Strength Low-Alloy

Aliquippa,Pa. J5	6.80
Bessemer,Ala. T2	6.80
Bethlehem,Pa B2	6.80
Clairton,Pa. U5	6.80
Cleveland R2	6.80
Ecorse,Mich. G5	6.90
Fairfield,Ala. T2	6.80
Fontana,Calif. K1	7.50
Gary,Ind. U5	6.80
Houston S5	7.05
Ind.Harb.,Ind. I-2, Y1	6.80
Johnstown,Pa. B2	6.80
KansasCity,Mo. S5	7.05
Lackawanna,N.Y. B2	6.80
LosAngeles B3	7.50
Pittsburgh J5	6.80
Seattle B3	7.55
S. Chicago W14	6.80
S.Duquesne.Pa. U5	6.80
S.SanFrancisco B3	7.55
Struthers,O. Y1	6.80
Warren.O. R2	6.80
Youngstown U5	6.80

BAR SIZE ANGLES; H.R. Carbon

Bethlehem,Pa. B2	4.80

BAR SIZE ANGLES; S. Shapes

Aliquippa,Pa. J5	4.65
Atlanta A11	4.85
Fontana,Calif. K1	5.35
Joliet,Ill. P22	5.10
Niles,Calif. P1	5.35
Pittsburgh J5	4.65
Portland,Oreg. O4	5.40
SanFrancisco S7	5.05

BAR SHAPES, Hot-rolled Alloy

Clairton,Pa. U5	5.65
Gary,Ind .U5	5.65
Houston S5	5.90
KansasCity,Mo. S5	5.90
Youngstown U5	5.65

BARS, C.F. Leaded Alloy

Ambridge,Pa. W18	8.325
Camden,N.J. P13	8.35
Chicago W18	8.325
Cleveland C20	8.325
Monaca,Pa. S17	8.325
Newark,N.J. W18	8.50
SpringCity,Pa. K3	8.30
Warren,O. C17	8.325

BARS, Cold-Finished Carbon

Ambridge,Pa. W18	5.90
BeaverFalls,Pa. M12, R2	5.90
Buffalo B5	5.95
Camden,N.J. P13	6.35
Carnegie,Pa. C12	5.90
Chicago W18	5.90
Cleveland A7, C20	5.90
Detroit R7	5.90
Detroit B5, P17	6.10
Donora,Pa. A7	5.90
Elyria,O. W18	5.90
FranklinPark,Ill. N5	5.90
Gary,Ind. R2	5.90
GreenBay,Wis. F7	5.90
Hammond,Ind. L2, M13	5.90
Hartford,Conn. R2	6.40
Harvey,Ill. B5	5.90
LosAngeles R2, S30	7.35
Mansfield,Mass. B5	6.45
Massillon.O. R2, R8	5.90
Midland,Pa. C18	5.90
Monaca,Pa. S17	5.90
Newark,N.J. W18	6.35
NewCastle,Pa.(17) B4	5.90
Pittsburgh J5	5.90
Plymouth,Mich. P5	6.15
Putnam,Conn. W18	6.45
Readville,Mass. C14	6.45
S.Chicago,Ill. W14	5.90
SpringCity,Pa. K3	6.35
Struthers,O. Y1	5.90
Waukegan,Ill. A7	5.90
Worcester,Mass. W19	6.35
Youngstown F3, Y1	5.90

BARS, Cold-Finished Carbon (Turned and Ground)

Cumberland,Md.(5) C19	5.16

BARS, Cold-Finished Alloy

Ambridge,Pa. W18	7.425
BeaverFalls,Pa.M12,R2	7.425
Bethlehem,Pa. B2	7.425
Buffalo B5	7.425
Camden,N.J. P13	7.60
Canton,O. T7	7.425
Carnegie,Pa. C12	7.425
Chicago W18	7.425
Cleveland A7, C20	7.425
Detroit R7	7.425
Detroit B5, P17	7.625
Donora,Pa. A7	7.425
Elyria,O. W8	7.425
Gary,Ind. R2	7.425
GreenBay,Wis F7	7.425
Hammond,Ind. L2,M13	7.425
Hartford,Conn. R2	7.725
Harvey,Ill. B5	7.425
Lackawanna,N.Y. B2	7.425
LosAngeles S30	9.10
Mansfield,Mass. B5	7.725
Massillon,O. R2, R8	7.425
Midland,Pa. C18	7.425
Monaca,Pa. S17	7.425
Newark,N.J. W18	7.60
Plymouth,Mich. P5	7.625
S.Chicago W14	7.425
SpringCity,Pa. K3	7.60
Struthers,O. Y1	7.425
Warren,O. C17	7.425
Waukegan,Ill. A7	7.425
Worcester,Mass. A7	7.725
Youngstown F3, Y1	7.425

BARS, Reinforcing (To Fabricators)

Ala.City,Ala. R2	4.65
Atlanta A11	4.85
Birmingham C15	5.15
Buffalo R2	4.65
Cleveland R2	4.65
Ecorse,Mich. G5	4.75
Emeryville,Calif. J7	5.40
Fairfield,Ala. T2	4.65
FairlessHills,Pa. U5	4.80
Fontana,Calif. K1	5.35
Ft.Worth,Tex.(42) T4	5.10
Gary,Ind. U5	4.65
Houston S5	4.90

Ind.Harbor,Ind. I-2, Y1	4.65
Johnstown,Pa. B2	4.65
Joliet,Ill P22	5.15
KansasCity,Mo. S5	4.90
Lackawanna,N.Y. B2	4.65
LosAngeles B3	5.35
Milton,Pa. M18	4.65
Minnequa,Colo. C10	5.10
Niles,Calif. P1	5.35
Pittsburg,Calif. C11	5.35
Pittsburgh J5	4.65
Portland,Oreg. O4	5.40
SandSprings,Okla. S5	5.15
Seattle B3, N14	5.40
S.Chicago R2	4.65
S.Duquesne,Pa. U5	4.65
S.SanFrancisco B3	5.40
SparrowsPoint,Md. B2	4.65
Sterling,Ill(1) N15	4.65
Sterling,Ill. N15	4.75
Struthers,O. Y1	4.65
Torrance,Calif. C11	5.35
Youngstown R2, U5, Y1	4.65

BARS, Reinforcing
(Fabricated; to Consumers)

Johnstown,Pa. ¼-1" B2	6.15
KansasCity,Kans. S5	6.45
Lackawanna,N.Y. B2	6.17
Marion,O. P11	6.15
Pittsburgh U8	6.17
Seattle B3, N14	6.60
SparrowsPt. ½-1" B2	6.15
Williamsport,Pa. S19	6.00

RAIL STEEL BARS

ChicagoHts.(3) C2, I-2	4.65
ChicagoHts.(4) C2, I-2	4.65
Ft.Worth,Tex.(26) T4	5.10
Franklin,Pa. (3) F5	4.65
Franklin,Pa.(4) F5	4.65
JerseyShore,Pa.(4) J8	4.50
Marion,O.(3) P11	4.65
Moline,Ill.(3) R2	4.65
Tonawanda(3) B12	4.65
Tonawanda(4) B12	5.15
Williamsport,Pa.(3) S19	4.65

BARS, Wrought Iron

Economy,Pa.(S.R.)B14	11.50
Economy,Pa.(D.R.)B14	14.30
Economy(Staybolt)B14	14.65
McK.Rks. (S.R.) L5	11.50
McK.Rks. (D.R.) L5	16.00
McK.Rks.(Staybolt) L5	17.00

SHEETS

SHEETS, Hot-Rolled Steel
(18 Gage and Heavier)

Ala.City,Ala. R2	4.325
Allenport,Pa. P7	4.325
Ashland,Ky.(8) A10	4.325
Cleveland J5, R2	4.325
Conshohocken,Pa. A3	4.375
Detroit(8) M1	4.425
Dravosburg,Pa. U5	4.325
Ecorse,Mich. G5	4.425
Fairfield,Ala. T2	4.325
FairlessHills,Pa. U5	4.375
Fontana,Calif. K1	5.075
Gary,Ind. U5	4.325
Geneva,Utah C11	4.425
GraniteCity,Ill. G4	4.525
Ind.Harbor,Ind. I-2, Y1	4.325
Kokomo,Ind. C16	4.425
Lackawanna,N.Y. B2	4.325
Mansfield,O. E6, (37)	4.325
Munhall,Pa. U5	4.325
Newport,Ky.(8) N9	4.325
Niles,O. N12	4.325
Pittsburg,Calif. C11	5.025
Pittsburgh J5	4.325
Portsmouth,O. P12	4.325
Riverdale,Ill. A1	4.55
Sharon,Pa. S3	4.325
S.Chicago,Ill. W14	4.325
SparrowsPoint,Md. B2	4.325
Steubenville,O. W10	4.325
Warren,O. R2	4.325
Weirton,W.Va. W6	4.325
Youngstown U5, Y1	4.325

SHEETS, H.R.(19 Ga. & Lighter)

Ala.City,Ala. R2	5.625
Kokomo,Ind. C16	5.475
Niles,O. N12	5.325

SHEETS, H.R. Alloy

Ind.Harbor,Ind. Y1	7.20
Youngstown Y1	7.20

SHEETS, H.R.(14 Ga. & Heavier) High-Strength Low-Alloy

Cleveland J5, R2	6.375
Conshohocken,Pa. A3	6.425
Dravosburg,Pa. U5	6.375
Ecorse,Mich. G5	6.475
Fairfield,Ala. T2	6.375
FairlessHills,Pa. U5	6.425
Fontana,Calif. K1	7.125
Gary,Ind U5	6.375
Ind.Harbor,Ind. I-2, Y1	6.375
Lackawanna(35) B2	6.375
Munhall,Pa. U5	6.375
Pittsburgh J5	6.375
Sharon,Pa. S3	6.375
S.Chicago,Ill. U5	6.375
SparrowsPoint(36) B2	6.375
Warren,O. R2	6.375
Weirton,W.Va. W6	6.375
Youngstown U5, Y1	6.375

SHEETS, Hot-Rolled Ingot Iron
(18 Gage and Heavier)

Ashland,Ky.(8) A10	4.575
Ind.Harbor,Ind. I-2	4.575

SHEETS, Cold-Rolled Steel
(Commercial Quality)

Allenport,Pa. P7	5.325
Cleveland J5, R2	5.325
Conshohocken,Pa. A3	5.375
Dravosburg,Pa. U5	5.325
Detroit M1	5.325
Ecorse,Mich. G5	5.425
Fairfield,Ala. T2	5.325
FairlessHills,Pa. U5	5.375
Follansbee,W.Va. F4	5.325
Fontana,Calif. K1	6.425
Gary,Ind. U5	5.325
GraniteCity,Ill. G4	5.525
Ind.Harbor,Ind. I-2, Y1	5.325
Lackawanna,N.Y. B2	5.325
Mansfield,O. E6	5.325
Middletown,O. A10	5.325
Newport,Ky. N9	5.325
Pittsburg,Calif. C11	6.275
Pittsburgh J5	5.325
Portsmouth,O. P12	5.325
SparrowsPoint,Md. B2	5.325
Steubenville,O. W10	5.325
Warren,O. R2	5.325
Weirton,W.Va. W6	5.325
Youngstown Y1	5.325

SHEETS, Cold-Rolled High-Strength Low-Alloy

Cleveland J5, R2	7.875
Dravosburg,Pa. U5	7.875
Ecorse,Mich. G5	7.975
FairlessHills,Pa. U5	7.925
Fontana,Calif. K1	8.975
Gary,Ind. U5	7.875
IndianaHarbor,Ind. Y1	7.875
Lackawanna(37) B2	7.875
Pittsburgh J5	7.875
SparrowsPoint(38) B2	7.875
Warren,O. R2	7.875
Weirton,W.Va. W6	7.875
Youngstown Y1	7.875

SHEETS, Cold-Rolled Ingot Iron

Middletown,O. A10	5.825

SHEETS, Culver (16 Gage)

	Cu Alloy	Cu Fe
Ashland,Ky. A10	6.90	...
Canton,O.R2	6.10	6.55
Dravosburg U5	6.10	...
Fairfield T2	6.10	...
Gary,Ind. U5	6.10	6.35
Ind.Harbor I-2	6.10	6.35
Kokomo,Ind. C16	6.20	...
MartinsFry. W10	6.10	...
Newport,Ky. N9	6.10	6.35
Pitts.,Calif. C11	6.85	...
SparrowsPt. B2	6.10	...

SHEETS, Culvert—Pure Iron

Ashland,Ky A10	7.15
Gary,Ind. U5	6.35
MartinsFry.,O. W10	6.35

SHEETS, Galvanized Steel Hot-Dipped

Ala.City, Ala. R2	5.85‡
Ashland,Ky. A10	5.85†
Canton,O. R2	5.85‡
Dover,O. R1	5.85†
Dravosburg,Pa. U5	5.85†
Fairfield,Ala. T2	5.85†
Gary,Ind. U5	5.85*
GraniteCity,Ill. G4	6.05
Ind.Harbor,Ind. I-2	5.85†
Kokomo,Ind. C16	5.95‡
MartinsFerry,O. W10	5.85*
Middletown,O. A10	5.85†
Newport,Ky. N9	5.85‡
Pittsburg,Calif. C11	6.60*
SparrowsPt.,Md. B2	5.85†
Warren,O. R2	5.85†
Weirton,W.Va. W6	5.85*

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*Continuous and noncontinuous. †Continuous. ‡Noncontinuous.

SHEETS, Well Casing

Fontana,Calif. K1	6.575

SHEETS, Galvanized High-Strength Low-Alloy

Dravosburg,Pa. U5	8.60
SparrowsPoint(39) B2	8.60

SHEETS, Galvannealed Steel

Canton,O. R2	6.25
Dravosburg,Pa. U5	6.25
Kokomo,Ind. C16	6.60
Newport,Ky. N9	6.25

SHEETS,Galvanized Ingot Iron
(Hot-dipped Continuous)

Ashland,Ky. A10	6.10
Middletown,O. A10	6.10

SHEETS, Electrogalvanized

Cleveland(28) R2	6.70
Niles,O.(28) R2	6.70
Weirton,W.Va. W6	6.55

SHEETS, Aluminum Coated

Butler,Pa. A10 (type 1)	8.50
Butler,Pa. A10 (type 2)	8.60

SHEETS, Enameling Iron

Ashland,Ky. A10	5.90
Cleveland R2	5.90
Dravosburg,Pa. U5	5.90
Gary,Ind. U5	5.90
GraniteCity,Ill. G4	6.10
Ind.Harbor,Ind. I-2	5.90
Middletown,O. A10	5.90
Niles,O. N12	5.90
Youngstown Y1	5.90

BLUED STOCK, 29 Gage

Follansbee,W.Va. F4	7.75
Ind.Harbor,Ind. I-2	7.75
Yorkville,O. W10	7.75

SHEETS, Long Terne Steel
(Commercial Quality)

BeechBottom,W.Va. W10	6.25
Gary,Ind. U5	6.25
Mansfield,O. E6	6.25
Middletown,O. A10	6.25
Niles,O. N12	6.25
Weirton,W.Va. W6	6.25

SHEETS, Long Terne, Ingot Iron

Middletown,O. A10	6.65

Key to Producers

A1	Acme Steel Co.
A3	Alan Wood Steel Co.
A4	Allegheny Ludlum Steel
A5	Alloy Metal Wire Div., H. K. Porter Co. Inc.
A6	American Shim Steel Co.
A7	American Steel & Wire Div., U. S. Steel Corp.
A8	Anchor Drawn Steel Co.
A9	Angell Nail & Chaplet
A10	Armco Steel Corp.
A11	Atlantic Steel Co.
B1	Babcock & Wilcox Co.
B2	Bethlehem Steel Co.
B3	Beth. Pac. Coast Steel
B4	Blair Strip Steel Co.
B5	Bliss & Laughlin Inc.
B8	Braeburn Alloy Steel
B9	Brainard Steel Div., Sharon Steel Corp.
B10	E. & G. Brooke, Wickwire Spencer Steel Div. Colo. Fuel & Iron
B11	Buffalo Bolt Co., Div., Buffalo-Eclipse Corp.
B12	Buffalo Steel Corp.
B14	A. M. Byers Co.
B15	J. Bishop & Co.
C1	Calstrip Steel Corp.
C2	Calumet Steel Div. Borg-Warner Corp.
C4	Carpenter Steel Co.
C7	Cleve. Cold Rolling Mills
C8	Cold Metal Products Co.
C9	Colonial Steel Co.
C10	Colorado Fuel & Iron
C11	Columbia-Geneva Steel
C12	Columbia Steel & Shaft.
C13	Columbia Tool Steel Co.
C14	Compressed Steel Shaft.
C15	Connors Steel Div. H. K. Porter Co. Inc.
C16	Continental Steel Corp.
C17	Copperweld Steel Co.
C18	Crucible Steel Co.
C19	Cumberland Steel Co.
C20	Cuyahoga Steel & Wire
C22	Claymont Steel Products Dept. Wickwire Spencer Steel Division
C23	Charter Wire Inc.
C24	G. O. Carlson Inc.
D2	Detroit Steel Corp.
D3	Detroit Tube & Steel Div., Sharon Steel Corp.
D4	Disston & Sons, Henry
D6	Driver-Harris Co.
D7	Dickson Weatherproof Nail Co.
D8	Damascus Tube Co.
D9	Wilbur B. Driver Co.
E1	Eastern Gas&Fuel Assoc.
E2	Eastern Stainless Steel
E4	Electro Metallurgical Co.
E5	Elliott Bros. Steel Co.
E6	Empire Steel Corp.
F2	Firth Sterling Inc.
F3	Fitzsimmons Steel Co.
F4	Follansbee Steel Corp.
F5	Franklin Steel Div. Borg-Warner Corp.
F6	Fretz-Moon Tube Co.
F7	Ft. Howard Steel & Wire
F8	Ft. Wayne Metals Inc.
G2	Globe Iron Co.
G4	Granite City Steel Co.
G5	Great Lakes Steel Corp.
G6	Greer Steel Co.
H1	Hanna Furnace Corp.
H7	Helical Tube Co.
I-1	Ingoe Bros. Inc.
I-2	Inland Steel Co.
I-3	Interlake Iron Corp.
I-4	Ingersoll Steel Div., Borg-Warner Corp.
I-6	Ivins, E., Steel Tube
I-7	Indiana Steel & Wire Co.
J1	Jackson Iron & Steel Co.
J3	Jessop Steel Co.
J4	Johnson Steel & Wire Co.
J5	Jones & Laughlin Steel
J6	Joslyn Mfg. & Supply
J7	Judson Steel Corp.
J8	Jersey Shore Steel Co.
K1	Kaiser Steel Corp.
K2	Keokuk Electro-Metals
K3	Keystone Drawn Steel
K4	Keystone Steel & Wire
K7	Kenmore Metals Corp.
L1	Laclede Steel Co.
L2	LaSalle Steel Co.
L3	Latrobe Steel Co.
L5	Lockhart Iron & Steel
L6	Lone Star Steel Co.
L7	Lukens Steel Co.
M1	McLouth Steel Corp.
M4	Mahoning Valley Steel
M6	Mercer Pipe Div., Sawhill Tubular Products
M8	Mid-States Steel & Wire
M12	Moltrup Steel Products
M13	Monarch Steel Div., Jones & Laughlin Steel Corp.
M14	McInnes Steel Co.
M16	Md.Fine & Special. Wire
M17	Metal Forming Corp.
M18	Milton Steel Prod. Div., Merritt-Chapman&Scott
N1	National-Standard Co.
N2	National Supply Co.
N3	National Tube Div., U. S. Steel Corp.
N5	Nelsen Steel & Wire Co.
N6	NewEng.HighCarb.Wire
N8	Newman-Crosby Steel
N9	Newport Steel Corp.
N12	Niles Rolling Mill Div. Sharon Steel Corp.
N14	Northwest.SteelRoll.Mills
N15	Northwestern S.&W. Co.
N16	New Delphos Mfg. Co.
N19	Northeastern Steel Corp.
O3	Oliver Iron & Steel Corp.
O4	Oregon Steel Mills
P1	Pacific States Steel Corp.
P2	Pacific Tube Co.
P4	Phoenix Iron & Steel Co. Sub. of Barium Steel Corp.
P5	Pilgrim Drawn Steel
P6	Pittsburgh Coke & Chem.
P7	Pittsburgh Steel Co.
P11	Pollak Steel Co.
P12	Portsmouth Division Detroit Steel Corp.
P13	Precision Drawn Steel
P14	Pitts. Screw & Bolt Co.
P15	Pittsburgh Metallurgical
P16	Page Steel & Wire Div., Amer. Chain & Cable
P17	Plymouth Steel Co.
P19	Pitts. Rolling Mills
P20	Prod. Steel Strip Corp.
P22	Phoenix Mfg. Co.
R1	Reeves Steel & Mfg. Co.
R2	Republic Steel Corp.
R3	Rhode Island Steel Corp.
R5	Roebling's Sons, John A.
R6	Rome Strip Steel Co.
R7	Rotary Electric Steel Co.
R8	RelianceDiv.,EatonMfg.
R9	Rome Mfg. Co.
R10	Rodney Metals Inc.
S1	Seneca Wire & Mfg. Co.
S3	Sharon Steel Corp.
S4	Sharon Tube Co.
S5	Sheffield Steel Div., Armco Steel Corp.
S6	Shenango Furnace Co.
S7	Simmons Co.
S8	Simonds Saw & Steel Co.
S12	Spencer Wire Corp.
S13	Standard Forgings Corp.
S14	Standard Tube Co.
S15	Stanley Works
S17	Superior Drawn Steel Co.
S18	Superior Steel Corp.
S19	Sweet's Steel Co.
S20	Southern States Steel
S23	Superior Tube Co.
S25	Stainless Welded Prod.
S26	Specialty Wire Co. Inc.
S30	Sierra Drawn Steel Corp.
S40	Seneca Steel Service
T2	Tenn. Coal & Iron Div. U. S. Steel Corp.
T3	Tenn. Prod. & Chem.
T4	Texas Steel Co.
T5	Thomas Strip Division, Pittsburgh Steel Co.
T6	Thompson Wire Co.
T7	Timken Roller Bearing
T9	Tonawanda Iron Div. Am. Rad. & Stan. San.
T13	Tube Methods Inc.
U4	Universal-Cyclops Steel
U5	United States Steel Corp.
U6	U. S. Pipe & Foundry
U7	Ulbrich Stainless Steels
U8	U. S. Steel Supply Div. U. S. Steel Corp.
V2	Vanadium-Alloys Steel
V3	Vulcan Crucible Division, H. K. Porter Co. Inc.
W1	Wallace Barnes Co.
W2	Wallingford Steel Co.
W3	Washburn Wire Co.
W4	Washington Steel Corp.
W6	Weirton Steel Co.
W7	W. Va. Steel & Mfg. Co.
W8	Western Automatic Machine Screw Co.
W9	Wheatland Tube Co.
W10	Wheeling Steel Corp.
W12	Wickwire Spencer Steel Div., Colo. Fuel & Iron
W13	Wilson Steel & Wire Co.
W14	Wisconsin Steel Div., International Harvester
W15	Woodward Iron Co.
W18	Wyckoff Steel Co.
W19	Worcester Pressed Steel
Y1	Youngstown Sheet & Tube

STRIP

STRIP, Hot-Rolled Carbon

Ala.City,Ala.(27) R2	4.325
Allenport,Pa. P7	4.325
Alton,Ill. L1	4.50
Ashland,Ky.(8) A10	4.325
Atlanta A11	4.525
Bessemer,Ala. T2	4.325
Birmingham C15	4.825
Bridgeport,Conn. N19	4.625
Buffalo(27) R2	4.325
Conshohocken,Pa. A3	4.375
Detroit M1	4.425
Ecorse,Mich. G5	4.425
Fairfield,Ala. T2	4.325
Fontana,Calif. K1	5.075
Gary,Ind. U5	4.325
Ind.Harbor,Ind. I-2, Y1	4.325
Johnstown,Pa.(25) B2	4.325
Lackaw'na,N.Y.(24) B2	4.325
LosAngeles(25) B3	5.075
Milton,Pa. M18	4.325
Minnequa,Colo. C10	5.425
NewBritain(10) S15	4.325
Pittsburg,Calif. C11	5.075
Portsmouth,O. P12	4.325
Riverdale,Ill. A1	4.55
SanFrancisco S7	5.05
Seattle(25) B3	5.325
Seattle N14	5.40
Sharon,Pa. S3	4.325
S.Chicago,Ill. W14	4.325
S.SanFrancisco(25) B3	5.075
SparrowsPoint,Md. B2	4.325
Sterling(1) N15	4.325
Sterling,Ill. N15	4.425
Torrance,Calif. C11	5.075
Warren,O. R2	4.325
Weirton,W.Va. W6	4.325
Youngstown U5	4.325

STRIP, Hot-Rolled Alloy

Bridgeport,Conn. N19	7.50
Carnegie,Pa. S18	7.20
Fontana,Calif. K1	8.85
Gary,Ind. U5	7.20
Ind.Harbor,Ind. Y1	7.20
LosAngeles B3	8.40
Newport,Ky. N9	7.20
Sharon,Pa. S3	7.20
S.Chicago W14	7.20
Youngstown U5, Y1	7.20

STRIP, Hot-Rolled High-Strength Low-Alloy

Bessemer,Ala. T2	6.425
Conshohocken,Pa. A3	6.425
Ecorse,Mich. G5	6.525
Fairfield,Ala. T2	6.425
Fontana,Calif. K1	7.525
Gary,Ind. U5	6.425
Houston S5	6.675
Ind.Harbor,Ind. I-2, Y1	6.425
KansasCity,Mo. S5	6.675
Lackawanna,N.Y. B2	6.425
LosAngeles(25) B3	7.175
Seattle(25) B3	7.425
Sharon,Pa. S3	6.425
S.SanFrancisco(25) B3	7.175
SparrowsPoint,Md. B2	6.425
Warren,O. R2	6.425
Weirton,W.Va. W6	6.425
Youngstown U5, Y1	6.425

STRIP, Hot-Rolled Ingot Iron

Ashland,Ky.(8) A10	4.575

STRIP, Cold-Rolled Carbon

Anderson,Ind. G6	6.25
Baltimore T6	6.25
Boston T6	6.80
Buffalo S40	6.25
Cleveland A7, J5	6.25
Conshohocken,Pa. A3	6.30
Dearborn Mich. D3	6.35
Detroit D2, M1, P20	6.35
Dover,O. G6	6.25
Ecorse,Mich. G5	6.35
Follansbee,W.Va. F4	6.25
Fontana,Calif. K1	8.00
FranklinPark,Ill. T6	6.35
Ind.Harbor,Ind. I-2	6.35
Ind.Harbor,Ind. Y1	6.25
Indianapolis C8	6.40
Lackawanna,N.Y. B2	6.25
LosAngeles C1	8.30
NewBedford,Mass. R10	6.70
NewBritain(10) S15	6.25
NewCastle,Pa. B4, E5	6.25
NewHaven,Conn. A7, D2	6.70
NewKensington,Pa. A6	6.25
Pawtucket,R.I. R3	6.90
Pawtucket,R.I. N8	6.80
Pittsburgh J5	6.25
Riverdale,Ill. A1	6.35
Rome,N.Y.(32) R6	6.25
Sharon,Pa. S3	6.25
SparrowsPt.,Md. B2	6.25
Trenton,N.J.(31) R5	7.80
Wallingford,Conn. W2	6.70
Warren,O. R2, T5	6.25
Weirton,W.Va. W6	6.25
Worcester,Mass. A7	6.80
Youngstown C8, Y1	6.25

STRIP, Cold-Rolled Alloy

Boston T6	13.80
Carnegie,Pa. S18	13.45
Cleveland A7	13.45
Dover,O. G6	13.45
FranklinPark,Ill. T6	13.45
Harrison,N.J. C18	13.45
Indianapolis C8	13.60
Pawtucket,R.I. N8	13.80
Sharon,Pa. S3	13.45
Worcester,Mass. A7	13.75
Youngstown C8	13.45

STRIP, Cold-Rolled High-Strength Low-Alloy

Cleveland A7	9.10
Dearborn,Mich. D3	9.20
Dover,O. G6	9.30
Ecorse,Mich. G5	9.20
Ind.Harbor,Ind. Y1	9.30
Lackawanna,N.Y. B2	9.10
Sharon,Pa. S3	9.10
SparrowsPoint,Md. B2	9.10
Warren,O. R2	9.10
Weirton,W.Va. W6	9.10
Youngstown Y1	9.30

STRIP, Electrogalvanized

Cleveland A7	6.25*
Dover,O. G6	6.25*
Riverdale,Ill. A1	6.35*
Youngstown C8	6.25*
Warren,O. T5	6.25*
Warren,O. B9	6.45*
Weirton,W.Va. W6	5.75*
Worcester,Mass. A7	6.80*

*Plus galvanizing extras.

STRIP, Galvanized (Continuous)

Sharon,Pa. S3	6.55

TIGHT COOPERAGE HOOP

Atlanta A11	5.05
Riverdale,Ill. A1	4.90
Sharon,Pa. S3	4.75
Youngstown U5	4.75

STRIP, Cold-Finished Spring Steel (Annealed)

	0.26-0.40C	0.41-0.60C	0.61-0.80C	0.81-1.05C	1.06-1.35C
Baltimore T6	7.30	9.25	10.80	12.95	15.65
Boston T6	7.55	9.25	10.80	12.95	15.65
Bristol,Conn. W1	...	...	10.80	12.95	15.65
Carnegie,Pa. S18	...	8.95	10.50	12.65	....
Cleveland A7	7.10	9.05	10.60	12.75	15.45
Cleveland C7	...	8.95	10.50	12.65	15.35
Dearborn,Mich. D3	7.10	9.05	10.60	....	....
Detroit D2	7.10	9.05	10.60	12.75	....
Dover,O. G6	7.10	9.05	10.60	12.75	15.45
Follansbee,W.Va. F4	7.00	8.95	10.50**	....	....
FranklinPark,Ill. T6	7.10	8.95	10.50	12.65	15.35
Harrison,N.J. C18	...	...	10.80	12.95	15.65
Indianapolis C8	7.15	9.10	10.50	12.65	15.35
NewBritain,Conn.(10) S15	7.10	9.05	10.60	12.75	15.45
NewCastle,Pa. B4, E5	7.10	9.05	10.60	12.75	....
NewHaven,Conn. D2	7.45	9.25	10.80	12.95	....
NewKensington,Pa. A6	7.00	8.95	10.50	....	....
NewYork W3	...	9.25	10.80	12.95	15.65
Pawtucket,R.I. N8	7.55	9.25	10.80	12.95	15.35
RiverdaleIll. A1	7.20	9.05	10.60	12.75	15.45
Rome,N.Y.(32) R6	7.00	8.95	10.50	12.65	15.35
Sharon,Pa. S3	7.10	9.05	10.60	12.75	15.45
Trenton,N.J. R5	...	9.25	10.80	12.95	15.65
Wallingford,Conn. W2	7.45	9.25	10.80	12.95	15.65
Warren,O. T5	7.00	8.95	10.50	12.65	15.35
Weirton,W.Va. W6	7.10	9.05	10.60	12.75	15.45
Worcester,Mass. T6	7.55	9.25	10.80	12.95	15.65
Worcester,Mass. A7	7.65	9.35	10.90	13.05	15.75
Youngstown C8	7.00	8.95	10.50	12.65	15.35

**0.65 C, max.

Spring Steel (Tempered)

	0.26-0.40C	0.41-0.60C	0.61-0.80C	0.81-1.05C	1.06-1.35C
Bristol,Conn. W1	...	...	14.40	17.60	....
Buffalo W12	...	...	14.40	....	....
FranklinPark,Ill. T6	...	...	14.90	18.10	21.50
Harrison,N.J. C18	...	...	14.40	17.60	21.00
NewYork W3	...	...	14.40	17.60	21.00
Trenton,N.J. R5	...	...	14.40	17.60	21.00
Worcester,Mass. W12	...	...	14.40	....	....
Worcester,Mass. A7, T6	...	...	14.40	17.60	21.00
Youngstown C8	...	...	14.75	17.95	21.35

SILICON STEEL

H.R. SHEETS (22 Ga., cut lengths)	Field	Armature	Electric	Motor	Dynamo
BeechBotton,W.Va. W10	...	...	9.95	10.95	11.85
Brackenridge,Pa. A4	...	...	9.95	10.95	11.85
Mansfield,O. E6	8.40	9.35	9.95	10.95	11.85
Newport,Ky. N9	8.40	9.35	9.95	10.95	11.85
Niles,O. N12	8.40	9.35	9.95	10.95	....
Vandergrift,Pa. U5	...	9.35	9.95	10.95	11.85
Warren,O. R2	8.40	9.35	9.95	10.95	11.85
Zanesville,O. A10	...	9.35	9.95	10.95	11.85

C.R. COILS & CUT LENGTHS, (22 Ga.) Fully Processed (Semiprocessed ½c lower)	Field	Armature	Electric	Motor	Dynamo
Brackenridge,Pa. A4	...	...	10.70	11.70	12.60
GraniteCity,Ill. G4	8.80*	9.80*	10.40*	11.40*	....
IndianaHarbor,Ind. I-2	8.60†	9.60*	10.20*	11.20*	....
Vandergrift,Pa. U5	...	10.10†	10.70†	11.70†	12.60†
Vandergrift,Pa. U5	8.60*	9.60*	10.20*	11.20*	12.10*
Warren,O. R2	8.60†	10.10	10.70	11.70	12.60

	Transformer Grade			
H.R. SHEETS (22 Ga., cut lengths)	T-72	T-65	T-58	T-52
BeechBottom,W.Va. W10	12.80	13.35	13.85	14.85
Brackenridge,Pa. A4	12.80	....	....	....
Newport,Ky. N9	12.80	....	....	....
Vandergrift,Pa. U5	12.80	13.35	13.85	14.85
Zanesville,O. A10	12.80§	13.35§	13.85§	14.85§

C.R. COILS & CUT LENGTHS (22 Ga.)	Grain Oriented				
	T-100	T-90	T-80	T-73	T-72
Brackenridge,Pa. A4	....	15.85	17.45	17.95	13.55§
Butler,Pa. A10	....	....	17.45	17.95	....
Vandergrift,Pa. U5	14.85	15.85	17.45	17.95	13.55
Warren,O. R2	....	....	....	....	13.55‡

*Semiprocessed. †Fully processed only. ‡Coils, annealed, semiprocessed ½c lower. §Coils, ¾-cent higher.

TIN MILL PRODUCTS

TIN PLATE Electrolytic (Base Box)	0.25 lb	0.50 lb	0.75 lb
Aliquippa,Pa. J5	$7.90	$8.15	$8.55
Dravosburg,Pa. U5	7.90	8.15	8.55
Fairfield,Ala. T2	8.00	8.25	8.65
FairlessHills,Pa. U5	8.00	8.25	8.65
Gary,Ind. U5	7.90	8.15	8.55
GraniteCity,Ill. G4	8.00	8.25	8.65
IndianaHarbor,Ind. I-2, Y1	7.90	8.15	8.55
Niles,O. R2	7.90	8.15	8.55
Pittsburg,Calif. C11	8.65	8.90	9.30
SparrowsPoint,Md. B2	8.00	8.25	8.65
Weirton,W.Va. W6	7.90	8.15	8.55
Yorkville,O. W10	7.90	8.15	8.55

ELECTROTIN (22-27 Gage; Dollars per 100 lb)			
Aliquippa,Pa. J5	6.675	....	....
Niles,O. R2	6.675	6.875	7.075

TINPLATE, American Coke (Base Box)	1.25 lb	1.50 lb
Aliquippa,Pa. J5	$9.20	$9.45
Dravosburg,Pa. U5	9.20	9.45
Fairfield,Ala. T2	9.30	9.55
Fairless,Pa. U5	9.30	9.55
Gary,Ind. U5	9.20	9.45
Ind.Har. I-2, Y1	9.20	9.45
Pitts.,Calif. C11	9.95	10.20
Sp.Pt.,Md. B2	9.30	9.55
Weirton,W.Va. W6	9.20	9.45
Yorkville,O. W10	9.20	9.45

BLACK PLATE (Base Box)

Aliquippa,Pa. J5	$7.00
Dravosburg,Pa. U5	7.00
Fairfield,Ala. T2	7.10
FairlessHills,Pa. U5	7.10
Gary,Ind. U5	7.00
GraniteCity,Ill. G4	7.10
Ind.Harbor,Ind. I-2, Y1	7.00
Niles,O. R2	7.00
Pittsburg,Calif. C11	7.75
SparrowsPoint,Md. B2	7.10
Warren,O. R2	7.00
Weirton,W.Va. W6	7.00
Yorkville,O. W10	7.00

HOLLOWARE ENAMELING Black Plate (29 Gage)

Dravosburg,Pa. U5	6.65
Gary,Ind. U5	6.65
GraniteCity,Ill. G4	6.75
Ind.Harbor,Ind. Y1	6.65
Yorkville,O. W10	6.65

MANUFACTURING TERNES (Special Coated; Base Box)

Dravosburg,Pa. U5	$8.70
Gary,Ind. U5	8.70
Yorkville,O. W10	8.70

MANUFACTURING TERNES (Light Coated, 6 lb; Base Box)

Yorkville,O. W10	$9.15

ROOFING SHORT TERNES (8 lb Coated; Base Box)

Gary,Ind. U5	$10.25

WIRE

WIRE, Manufacturers Bright, Low Carbon

AlabamaCity,Ala. R2	6.25
Aliquippa,Pa. J5	6.25
Alton,Ill. L1	6.425
Atlanta A11	6.45
Bartonville,Ill. K4	6.35
Buffalo W12	6.25
Chicago W13	6.25
Cleveland A7	6.25
Crawfordsville,Ind. M8	6.35
Donora,Pa. A7	6.25
Duluth,Minn. A7	6.25
Fairfield,Ala. T2	6.25
Fostoria,O.(24) S1	6.45
Houston S5	6.50
Jacksonville,Fla. M8	6.77
Johnstown,Pa. B2	6.25
Joliet,Ill. A7	6.25
KansasCity,Mo. S5	6.50
Kokomo,Ind. C16	6.35
LosAngeles B3	7.20
Minnequa,Colo. C10	6.50
Monessen,Pa. P7	6.25
Newark 6-8 ga. I-1	6.90
N.Tonawanda B11	6.25
Palmer,Mass. W12	6.55
Pittsburg,Calif. C11	7.20
Portsmouth,O. P12	6.25
Rankin,Pa. A7	6.25
S.Chicago,Ill. R2	6.25
S.SanFrancisco C10	7.20
SparrowsPoint,Md. B2	6.35
Sterling Ill.(1) N15	6.25
Sterling Ill. N15	6.35
Struthers,O. Y1	6.25
Waukegan,Ill. A7	6.25
Worcester,Mass. A7	6.55

WIRE, MB Spring, High Carbon

Aliquippa,Pa. J5	7.90
Alton,Ill. L1	8.075
Bartonville,Ill. K4	8.00
Buffalo W12	7.90
Cleveland A7	7.90
Donora,Pa. A7	7.90
Duluth,Minn. A7	7.90
Fostoria,O. S1	7.95
Johnstown,Pa. B2	7.90
LosAngeles B3	8.85
Milbury,Mass.(12) N6	8.20
Minnequa,Colo. C10	8.15
Monessen,Pa. P16	7.90
Muncie,Ind. I-7	8.10
Palmer,Mass. W12	8.20
Pittsburg,Calif. C11	8.85
Portsmouth,O. P12	7.90
Roebling,N.J. R5	8.20
S.Chicago,Ill. R2	7.90
S.SanFrancisco C10	8.85
SparrowsPt.,Md. B2	8.00
Struthers,O. Y1	7.90
Trenton,N.J. A7	8.20
Waukegan,Ill. A7	7.90
Worcester A7,J4,T6,W12	8.20

WIRE, Upholstery Spring

Aliquippa,Pa. J5	7.60
Alton,Ill. L1	7.775
Buffalo W12	7.60
Cleveland A7	7.60
Donora,Pa. A7	7.60
Duluth,Minn. A7	7.60
Johnstown,Pa. B2	7.60
KansasCity,Mo. S5	7.85
LosAngeles B3	8.55
Minnequa,Colo. C10	7.775
Monessen,Pa. P16	7.60
NewHaven,Conn. A7	7.90
Palmer,Mass. W12	7.90
Pittsburg,Calif. C11	8.55
Portsmouth,O. P12	7.60
Roebling,N.J. R5	7.90
S.Chicago,Ill. R2	7.60
S.SanFrancisco C10	8.55
SparrowsPoint,Md. B2	7.70
Struthers,O. Y1	7.60
Trenton,N.J. A7	7.90
Waukegan,Ill. A7	7.60
Worcester,Mass. A7	7.90

WIRE. Fine & Weaving (8"Coils)

Alton,Ill. L1	12.725
Bartonville,Ill. K4	12.65
Buffalo W12	12.55
Chicago W13	12.55
Cleveland A7	12.55
Crawfordsville,Ind. M8	12.65
Fostoria,O. S1	12.55
Jacksonville,Fla. M8	13.08
Johnstown,Pa. B2	12.55
Kokomo,Ind. C16	12.55
Minnequa,Colo. C10	12.30
Monessen,Pa. P16	12.55
Muncie,Ind. I-7	12.75
Palmer,Mass. W12	12.85
Roebling,N.J. R5	12.85
S.SanFrancisco C10	12.9
Waukegan,Ill. A7	12.55
Worcester,Mass. A7,T6	12.85

WIRE, Gal'd ACSR for Cores

Bartonville,Ill. K4	10.70
Buffalo W12	10.70
Johnstown,Pa. B2	10.70
Minnequa,Colo. C10	10.825
Monessen,Pa. P16	10.70
Muncie,Ind. I-7	10.90
Pittsburg,Calif. C11	11.50
Portsmouth,O. P12	10.70
Roebling,N.J. R5	11.00
SparrowsPt.,Md. B2	10.80

ROPE WIRE	(A)
Bartonville,Ill. K4	10.55
Buffalo W12	10.55
Fostoria,O. S1	10 55
Johnstown,Pa. B2	10.55
Monessen,Pa. P16	10.55
Muncie,Ind. I-7	10.75
Palmer,Mass. W12	10.85
Portsmouth,O. P12	9.75
Roebling,N.J. R5	10.85
SparrowsPt. B2	10.65
Struthers,O. Y1	10.55
Worcester,Mass. J4	10.85

(A) Plow and Mild Plow; add 0.25c for Improved Plow.

WIRE

(Continued)

WIRE, Tire Bead

Bartonville,Ill. K4	14.15
Monessen,Pa. P16	14.20
Roebling,N.J. R5	14.35

WIRE, Cold-Rolled Flat

Anderson,Ind. G6	9.00
Baltimore T6	9.30
Buffalo W12	9.00
Cleveland A7	9.00
Crawfordsville,Ind. M8	9.00
Dover,O. G6	9.00
Fostoria,O. S1	9.00
FranklinPark,Ill. T6	9.10
Kokomo,Ind. C16	9.00
Massillon,O. R8	9.00
Milwaukee C23	9.20
Monessen,Pa. P16	9.00
Pawtucket,R.I. N8	9.30
Riverdale,Ill. A1	9.10
Rome,N.Y. R6	9.00
Trenton,N.J. R5	9.30
Worcester A7, T6, W12	9.30

NAIL, Stock

To Dealers & Mfrs. (7)	Col.
AlabamaCity,Ala. R2	152
Aliquippa,Pa. J5	152
Atlanta A11	154
Bartonville,Ill. K4	154
Chicago,Ill. W13	152
Cleveland A9	157
Crawfordsville,Ind. M8	154
Donora,Pa. A7	152
Duluth,Minn. A7	152
Fairfield,Ala. T2	152
Galveston,Tex. D7	157
Houston,Tex. S5	157
Johnstown,Pa. B2	152
Joliet,Ill. A7	152
KansasCity,Mo. S5	157
Kokomo,Ind. C16	154
Minnequa,Colo. C10	157
Monessen,Pa. P7	152
Pittsburg,Calif. C11	171
Rankin,Pa. A7	152
S.Chicago,Ill. R2	152
SparrowsPt.,Md. B2	154
Sterling,Ill.(1) N15	152
Worcester,Mass. A7	158

NAILS, CUT (100 lb keg)

To Dealers (33)	
Conshohocken,Pa. A3	$9.05
Wheeling,W.Va. W10	9.05

STAPLES, Polished Stock

To Dealers & Mfrs. (7)	Col.
Aliquippa,Pa. J5	152
Atlanta A11	154
Bartonville,Ill. K4	154
Crawfordsville,Ind. M8	154
Donora,Pa. A7	152
Duluth,Minn. A7	152
Fairfield,Ala. T2	152
Johnstown,Pa. B2	152
Joliet,Ill. A7	152
Kokomo,Ind. C16	154
Minnequa,Colo. C10	157
Monessen,Pa. P7	152
Pittsburg,Calif. C11	171
Rankin,Pa. A7	152
SparrowsPt.,Md. B2	154
Sterling,Ill.(1) N15	152
Worcester,Mass. A7	158

TIE WIRE, Automatic Baler (14½ Ga.) (Per 97 lb Net Box)

Coil No. 3150	
AlabamaCity,Ala R2	$9.35
Bartonville,Ill. K4	9.45
Buffalo W12	9.35
Crawfordsville,Ind. M8	9.46
Donora,Pa. A7	9.35
Duluth,Minn. A7	9.35
Johnstown,Pa. B2	9.35
Joliet,Ill. A7	9.35
Kokomo,Ind. C16	9.45
LosAngeles B3	10.14
Minnequa,Colo. C10	9.60
Pittsburg,Calif. C11	10.13
S.Chicago,Ill. R2	9.35
SparrowsPt.,Md. B2	9.45
Sterling,Ill. N15	9.35

Coil No. 6500 Stand.	
AlabamaCity,Ala. R2	$9.65
Bartonville,Ill. K4	9.75
Buffalo W12	9.60
Crawfordsville,Ind. M8	9.75
Donora,Pa. A7	9.65
Duluth,Minn. A7	9.65
Johnstown,Pa. B3	9.65
Joliet,Ill. A7	9.65
Kokomo,Ind. C16	9.75
LosAngeles B3	10.45
MinnequaColo. C10	9.90
Pittsburg,Calif. C11	10.45
S.Chicago,Ill. R2	9.65
SparrowsPt.,Md. B2	9.75
Sterling,Ill. N15	9.65

Coil No. 6500 Interim	
AlabamaCity,Ala. R2	$9.70
Bartonville,Ill. K4	9.80
Buffalo W12	9.70
Crawfordsville,Ind. M8	9.80
Donora,Pa. A7	9.70
Duluth,Minn. A7	9.70
Johnstown,Pa. B2	9.70
Joliet,Ill. A7	9.70
Kokomo,Ind. C16	9.80
LosAngeles B3	10.50
Minnequa,Colo. C10	9.95
Pittsburg,Calif. C11	10.50
S.Chicago,Ill. R2	9.70
SparrowsPt.,Md. B2	9.80
Sterling,Ill. N15	9.70

WIRE, Barbed

	Col.
AlabamaCity,Ala. R2	175**
Aliquippa J5	172§
Atlanta A11	181
Bartonville,Ill. K4	181
Crawfordsville,Ind. M8	181
Donora,Pa. A7	175†
Duluth,Minn. A7	175†
Fairfield,Ala. T2	175†
Houston,Tex. S5	180†
Johnstown,Pa. B2	179*
Joliet,Ill. A7	175†
KansasCity,Mo. S5	180†
Kokomo,Ind. C16	177†
Minnequa,Colo. C10	180**
Monessen,Pa. P7	178††
Pittsburg,Calif. C11	195†
Rankin,Pa. A7	175†
S.Chicago,Ill. R2	175**
S.SanFrancisco C10	195**
SparrowsPoint,Md. B2	181*
Sterling,Ill.(1) N15	179††

WOVEN Fence, 9-15 ga.

	Col.
Ala.City,Ala. R2	162**
Ala.City, 17 ga. R2	257**
Ala.City, 18 ga. R2	267**
Aliq'ppa,Pa.9-14½ga J5	165§
Atlanta A11	168
Bartonville,Ill. K4	168
Crawfordsville,Ind. M8	168
Donora,Pa. A7	162†
Duluth,Minn. A7	162†
Fairfield,Ala. T2	162†
Houston,Tex. S5	167†
Johnstown,Pa.(43) B2	166
Joliet,Ill. A7	162†
KansasCity,Mo. S5	167†
Kokomo,Ind. C16	164†
Minnequa,Colo. C10	167**
Monessen,Pa. 9 ga. P17	166††
Pittsburg,Calif. C11	185†
Rankin,Pa. A7	162†
S.Chicago,Ill. R2	162**
Sterling,Ill.(1) N15	166††

Wire (16 Gage)	An'ld Stone	Galv. Stone
Ala.City R2	14.50	16.05**
Bartonville K4	14.60	16.55
Buffalo W12	14.50	....
Cleveland A7	14.50	....
Crawf'dsville M8	14.60	16.55
Fostoria,O. S1	14.60	16.15†
Johnstown B2	14.50	16.40*
Kokomo C16	14.60	16.15†
Minnequa C10	14.75	16.45**
Palmer,MassW12	14.50	16.05*
Pitts.,Calif. C11	14.85	16.40†
S.Chicago R2	14.50	16.05**
SparrowsPt. B2	14.60	16.50*
Sterling(1) N15	14.50	16.45††
Waukegan A7	14.50	16.05†
Worcester A7	14.80	....

WIRE, Merchant Quality

(6 to 8 gage)	An'ld	Galv.
Ala.City,Ala. R2	7.40	7.80**
Aliquippa J5	7.40	7.925§
Atlanta A11	7.50	8.10
Bartonville(48) K4	7.50	8.10
Buffalo W12	7.40	8.80†
Cleveland A7	7.40	....
Crawfordsville M8	7.50	8.10
Donora,Pa. A7	7.40	7.80†
Duluth,Minn. A7	7.40	7.80†
Fairfield T2	7.40	7.80†
Houston,Tex. S5	7.65	8.05†
Jacks'ville,Fla.M8	7.90	8.475
Johnstown B2(48)	7.40	7.975*
Joliet,Ill. A7	7.40	7.80†
KansasCity,Mo. S5	7.65	8.05†
Kokomo C16	7.50	7.90†
LosAngeles B3	8.35	8.925*
Minnequa C10	7.65	8.05**
Monessen P7(48)	7.40	8.00††
Palmer,Mass. W12	7.70	8.10†
Pitts.,Calif. C11	8.35	8.75†
Portsmouth,O. P12	7.40	....
Rankin A7	7.40	7.80†
S.Chicago R2	7.40	7.80**
S.SanFran. C10	8.35	8.75**
Spar'wsPt.B2(48)	7.50	8.075*
Str'ing(1)(48)N15	7.40	8.00††
Struthers,O.(48)Y1	7.40	7.90‡
Worcester,Mass.A7	7.70	....

*Based on 12.50c zinc; †5c zinc; §10c zinc; ‡Less than 10c zinc; **Subject to zinc equalization extras. ††13c zinc.

BALE TIES, Single Loop

	Col.
AlabamaCity,Ala. R2	173
Atlanta A11	175
Bartonville,Ill. K4	175
Crawfordsville,Ind. M8	175
Donora,Pa. A7	173
Duluth,Minn. A7	173
Fairfield,Ala. T2	173
Joliet,Ill. A7	173
Houston S5	178
KansasCity,Mo. S5	178
Kokomo,Ind. C16	175
Minnequa,Colo. C10	178
S.Chicago R2	173
S.SanFran.,Calif. C10	197
SparrowsPoint,Md. B2	175
Sterling,Ill.(1) N15	173

FENCE POSTS

	Col.
ChicagoHts.,Ill. C2, I-2	157
Duluth,Minn. A7	157
Franklin,Pa. F5	157
Huntington,W.Va. W7	157
Johnstown,Pa. B2	157
Marion,O. P11	157
Minnequa,Colo. C10	162
Moline,Ill. R2	162
S.Chicago,Ill. R2	157
Tonawanda,N.Y. B12	157
Williamsport,Pa. S10	160

FASTENERS

(Base discounts, full case quantity, per cent off list to consumer, f.o.b. mill)

Carriage, Machine Bolts	
Full-Size Body (cut thread)	
†½" x 6" and smaller	61
Larger than ½" diam. and all diams. longer than 6"	55
Under-Size Body (rolled thread; not nutted):	
½" x 6" and smaller.	61

†½" x 4" and smaller and shorter are not nutted.

Carriage, Machine & Lag Bolts, Hot Galvanized:	
½" and smaller	42
Larger than ½" diam. and all diams. longer than 6"	32
Lag Bolts	
All diams. & 6" and shorter	61
All diams. longer than 6"	55
Plow, Tap & Blank Bolts	
½" x 6" and smaller.	61
Larger than ½" diam. and all diams. longer than 6"	55
Ribbed Neck, Carriage, Step, Elevator, Fitting-up and Tire Bolts:	
All sizes	61
STOVE BOLTS, SLOTTED (nuts not attached; bulk)	
⅛" to ¼" diam. incl., 3" or shorter:	
25,000 to 199,999 pieces	61
200,000 or more pieces	64
5/16" to ½" diam. incl., 3" or shorter:	
15,000 to 99,999 pieces	61
100,000 or more pieces	64
Longer than 3", any diam.:	
5000 to 99,999 pieces.	61
100,000 or more pieces	64

RIVETS

F.o.b. Cleveland and/or freight equalized with Pittsburgh, f.o.b. Chicago, and/or freight equalized with Birmingham except where equalization is too great.

Structural ½-in., larger	9.95
7/16-in. under	List less 32%

BOILER TUBES

Net base c.l. prices, dollars per 100 ft, mill; minimum wall thickness, cut lengths 10 to 24 ft, inclusive.

O.D. In.	B.W. Gage	Seamless H.R.	Seamless C.D.	Elec. Weld H.R.
1	13	....	21.06	20.42
1¼	13	....	24.94	20.45
1½	13	23.31	27.57	22.61
1¾	13	27.54	32.57	26.71
2	13	30.87	36.51	29.93
2¼	13	34.77	41.12	33.72
2¼	12	37.73	44.63	36.60
2½	12	41.57	49.16	40.31
2¾	12	45.00	53.22	43.65
3	12	47.99	56.76	46.55

RAILWAY MATERIALS

RAILS	Standard No. 1	Standard No. 2	Tee Rails All No. 2	Tee Rails 60 lb Under
Bessemer,Pa. U5	4.725	4.625	4.675	5.65
Ensley,Ala. T2	4.725	4.625	....	5.65
Fairfield,Ala. T2	....	....	....	5.65
Gary,Ind. U5	4.725	4.625	4.675	...
Huntington,W.Va. W7	....	....	....	5.65
IndianaHarbor,Ind. I-2	4.725	4.625	4.675	...
Johnstown,Pa. B2	....	....	...	(16)5.65
Lackawanna,N.Y. B2	4.725	4.625	...	(16)5.65
Minnequa,Colo. C10	4.725	4.625	....	6.15
Steelton,Pa. B2	4.725	4.625	....	...
Williamsport,Pa. S19	....	....	....	5.65

TIE PLATES

Fairfield,Ala. T2	5.625
Gary,Ind. U5	5.625
Ind.Harbor,Ind. I-2	5.625
Lackawanna,N.Y. B2	5.625
Minnequa,Colo. C10	5.625
Seattle B3	5.775
Steelton,Pa. B2	5.625
Torrance,Calif. C11	5.775

TRACK BOLTS (20) Treated

Cleveland R2	12.40
KansasCity,Mo. S5	12.40
Lebanon,Pa. B2	12.40
Minnequa,Colo. C10	12.40
Pittsburgh O3, P14	12.40
Seattle B3	12.90

AXLES

Ind.Harbor,Ind. S13	7.25
Johnstown,Pa. B2	7.25

JOINT BARS

Bessemer,Pa. U5	5.825
Fairfield,Ala. T2	5.825
Ind.Harbor,Ind. I-2	5.825
Joliet,Ill. U5	5.825
Lackawanna,N.Y. B2	5.825
Minnequa,Colo. C10	5.825
Steelton,Pa. B2	5.825

SCREW SPIKES

Cleveland R2	11.90
Pittsburgh O3	11.90

STANDARD TRACK SPIKES

Fairfield,Ala. T2	7.90
Ind.Harbor,Ind. I-2, Y1	7.90
KansasCity,Mo. S5	7.90
Lebanon,Pa. B2	7.90
Minnequa,Colo. C10	7.90
Pittsburgh J5	7.90
Seattle B3	8.40
S.Chicago,Ill. R2	7.90
Struthers,O. Y1	7.90
Youngstown R2	7.90

METAL POWDER

(Per pound f.o.b. shipping point in ton lots for minus 100 mesh, except as otherwise noted)

	Cents
Sponge iron:	
98+% Fe, annealed.	9.25
Swedish, c.i.f. Camden, N. J., c.l. in bags.	9.50
Domestic, f.o.b. Riverton, N.J. and Niagara Falls, N. Y., in bags	9.50
Canadian, f.o.b. Shipping point	9.50
Electrolytic iron:	
Melting stock, 99.9% Fe, irregular fragments of ⅛ in. x 1.3 in.	22.00
Annealed, 99.5% Fe.	36.50
Unannealed (99+% Fe)	34.00
Unannealed (99+% Fe) (minus 325 mesh)	57.00
Powder Flakes (minus 16, plus 100 mesh)	31.00
Carbonyl Iron:	
97.9-99.8% size 5 to 10 microns	83.00-148.00
Aluminum:	
Atomized, 500 lb. drum frght. allowed	
Carlots	34.50
Ton lots	36.50
Antimony, 500 lb lots	32.00*
Brass, 5000-lb lots	38.00-50.00†
Bronze, 5000-lb lots	61.25-64.50†
Copper:	
Electrolytic	14.25*
Reduced	14.25*
Lead	7.50*
Manganese:	
Minus 35 mesh	64.00
Minus 100 mesh	70.00
Minus 200 mesh	75.00
Nickel, unannealed	$1.00
Nickel-Silver, 5000-lb lots	58.75-61.50†
Phosphor-Bronze, ¼-ton lots	58.50
Silicon	47.50
Solder	7.00*
Stainless Steel, 302	99.00
Stainless Steel, 316	$1.32
Tin	14.50*
Zinc, 5000-lb lots	18.75-32.50‡

Tungsten	Dollars
Melting grade, 99% 60 to 200 mesh:	
1000 lb and over	4.30
Less than 1000 lb.	4.45
Chromium, electrolytic 99.2% Cr min.	3.50

*Plus cost of metal. †Depending on composition. ‡Depending on mesh. §70% Cu, 20% Zn, 10% Ni, **64% Cu, 18% Zn, 18% Ni.

Footnotes

(1) Chicago Base.
(2) Angles, flats, bands.
(3) Merchant.
(4) Reinforcing.
(5) 1⅛-in. to less than 1 7/16-in.
(6) Chicago or Birm. base.
(7) To jobbers, 3 cols. lower.
(8) 16 Ga. and heavier.
(9) Merchant quality; add 0.35c for special quality.
(10) Pittsburgh base.
(11) Cleveland & Pitts. base.
(12) Worcester, Mass., base.
(13) Add 0.25c for 17 Ga. & heavier.
(14) Gage 0.143 to 0.249 in.; for gage 0.142 and lighter, 5.80c.
(15) ⅜" and thinner.
(16) 40 lb and under.
(17) Flats only; 0.25 in. & heavier.
(18) To dealers.
(19) Chicago & Pitts. base.
(20) 0.25 off for untreated.
(21) New Haven, Conn., base.
(22) Deld. San Francisco Bay area.
(24) Deduct 0.10c, finer than 15 Ga.
(25) Bar mill bands.
(26) Delivered in mill zone, 5.25c.
(27) Bar mill sizes.
(28) Bonderized.
(29) Youngstown base.
(30) Sheared; for universal mill and 0.45c for carbon, add 0.40c for alloy and 0.45c H.S.-L.A.
(31) Widths over ⅝-in.; 6.90c for widths ⅝-in. and under by 0.125 in. and thinner.
(32) Buffalo base.
(33) To jobbers, deduct 20c.
(34) 9.60c for cut lengths.
(35) 72" and narrower.
(36) 54" and narrower.
(37) 13 Ga. & heavier; 60" & narrower.
(38) 14 Ga. & lighter; 48" & narrower.
(39) 48" and narrower.
(40) Lighter than 0.035"; 0.035" and heavier, 0.25c higher.
(41) 9.10c for cut lengths.
(42) Mill lengths, f.o.b. mill; deld. in mill zone or within switching limits, 5.25c.
(43) 9-14½ Ga.
(48) 6-7 Ga.

SEAMLESS STANDARD PIPE, Threaded and Coupled

Carload discounts from list, %

Size—Inches	2		2½		3		3½		4		5		6	
List Per Ft	37c		58.5c		76.5c		92c		$1.09		$1.48		$1.92	
Pounds Per Ft	3.68		5.82		7.62		9.20		10.89		14.81		19.18	
	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*
Aliquippa, Pa. J5	6.5	+10	10.5	+7.25	13	+4.75	14.5	+3.25	14.5	+3.25	14	+3.75	16.5	+1.25
Ambridge, Pa. N2	6.5	..	10.5	...	13	...	14.5	...	14.5	...	14	...	16.5	...
Lorain, O. N3	6.5	+10	10.5	+7.25	13	+4.75	14.5	+3.25	14.5	+3.25	14	+3.75	16.5	+1.25
Youngstown Y1	6.5	+10	10.5	+7.25	13	+4.75	14.5	+3.25	14.5	+3.25	14	+3.75	16.5	+1.25

ELECTRIC WELD STANDARD PIPE, Threaded and Coupled

Carload discounts from list, %

Youngstown R2	6.5	+10	10.5	+7.25	13	+4.75	14.5	+3.25	14.5	+3.25	14	+3.75	16.5	+1.25

BUTTWELD STANDARD PIPE, Threaded and Coupled

Carload discounts from list, %

Size—Inches	⅛		¼		⅜		½		¾		1		1¼	
List Per Ft	5.5c		6c		6c		8.5c		11.5c		17c		23c	
Pounds Per Ft	0.24		0.42		0.57		0.85		1.13		1.68		2.28	
	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*
Aliquippa, Pa. J5	...	...	....	....	....	....	17.5	0.25	20.5	4.25	23	7.75	25.5	9
Alton, Ill. L1	...	...	....	....	....	....	15.5	+1.75	18.5	2.25	21	5.75	23.5	7
Benwood, W. Va. W10	16.5	+12	7.25	+18.25	+1.75	+26.25	17.5	0.25	20.5	4.75	23	7.75	25.5	7
Butler, Pa. F6	17.5	+11	9	+16.5	0.5	+24	...	...	...	...	...	...	...	...
Etna, Pa. N2	...	...	....	....	....	....	17.5	0.25	20.5	4.25	23	7.75	25.5	9
Fairless Hills, Pa. N3	...	...	....	....	....	....	16.5	+0.75	19.5	3.75	22	6.75	24.5	8
Fontana, Calif. K1	...	...	....	....	....	....	6	+11.25	9	+7.25	11.5	+3.75	14	+2.5
Ind. Harbor, Ind. Y1	...	...	....	....	....	....	17.5	0.25	20.5	4.25	23	7.75	25.5	9
Lorain, O. N3	...	...	....	....	....	....	18.5	1.25	21.5	5.25	24	8.75	26.5	10
Sharon, Pa. S4	17.5	+11	9	+16.5	0.5	+24	...	...	...	...	...	...	...	...
Sharon, Pa. M6	...	...	....	....	....	....	17.5	0.25	20.5	4.25	23	7.75	25.5	9
Sparrows Pt., Md. B2	15.5	+13	7	+18.5	+1.5	+26	15.5	+1.75	18.5	2.25	21	5.75	23.5	7
Youngstown R2, Y1	...	...	....	....	....	....	18.5	1.25	21.5	5.25	24	8.75	26.5	10
Wheatland, Pa. W9	17.5	+11	9	+16.5	0.5	+24	17.5	0.25	20.5	4.25	23	7.75	25.5	9

Size—Inches	1½		2		2½		3		3½		4	
List Per Ft	27.5c		37c		58.5c		76.5c		92c		$1.09	
Pounds Per Ft	2.73		3.68		5.82		7.62		9.20		10.89	
	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*
Aliquippa, Pa. J5	26	10	26.5	10.5	28	10.75	28	10.75	....	...	....	...
Alton, Ill. L1	24	8	24.5	8.5	26	8.75	26	8.75	....	...	....	...
Benwood, W. Va. W10	26	10	26.5	10.5	28	10.75	28	10.75	18.5	0.75	18.5	0.75
Etna, Pa. N2	26	10	26.5	10.5	28	10.75	28	10.75	18.5	0.75	18.5	0.75
Fairless Hills, Pa. N3	25	9	25.5	9.5	27	9.75	27	9.75	17.5	+0.25	17.5	+0.25
Fontana, Calif. K1	14.5	+1.5	15	+1	16.5	+0.75	16.5	+0.75	7	+10.75	7	+10.75
Ind. Harbor, Ind. Y1	26	10	26.5	10.5	28	10.75	28	10.75	18.5	0.75	18.5	0.75
Lorain, O. N3	27	11	27.5	11.5	29	11.75	29	11.75	....	...	....	...
Sharon, Pa. M6	26	10	26.5	10.5	28	10.75	28	10.75	....	...	....	...
Sparrows Pt., Md. B2	24	8	24.5	8.5	26	8.75	26	8.75	16.5	+1.25	16.5	+1.25
Youngstown R2, Y1	27	11	27.5	11.5	29	11.75	29	11.75	19.5	1.75	19.5	1.75
Wheatland, Pa. W9	26	10	26.5	10.5	28	10.75	28	10.75	18.5	0.75	18.5	0.75

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*Galvanized pipe discounts based on current price of zinc (13.00c, East St. Louis).

Stainless Steel

Representative prices, cents per pound; subject to current lists of extras

AISI Type	Rerolling Ingots	Rerolling Slabs, Billets	Forging Billets	Seamless Tube Billets	H.R. Strip	Shapes; H.R. & C.F. Bars; Wire	Plates	Sheets	C.R. Strip; Flat Wire
201	17.00	21.50	....	....	31.00	....	....	42.25	39.00
202	18.25	24.00	31.00	36.25	33.50	36.75	38.75	42.50	42.50
301	17.75	22.25	....	36.75	32.00	38.00	....	44.25	41.00
302	19.00	24.75	32.00	37.25	34.50	38.25	40.25	44.50	44.50
302B	20.25	26.50	33.00	37.25	37.75	38.25	40.25	47.00	47.00
303	....	26.75	34.75	40.00	....	41.00	....	....	....
304	20.25	26.00	33.75	39.00	37.25	40.25	43.00	47.25	47.25
304L	....	....	38.75	44.00	42.25	45.25	48.00	52.25	52.25
305	21.75	28.25	....	39.50	40.25	40.25	43.50	50.25	50.25
308	22.00	29.00	38.50	44.25	41.25	45.50	49.75	52.00	52.00
309	29.50	38.25	46.75	53.50	53.50	54.75	58.25	67.00	67.00
309S	31.50	41.00	51.00	59.00	58.50	60.25	63.75	74.00	74.00
310	37.25	48.00	62.25	72.25	68.50	73.50	75.25	78.75	78.75
314	....	....	....	....	....	....	75.25	....	....
316	31.50	40.25	51.25	59.50	58.25	60.75	64.00	68.25	68.25
316L	....	....	56.25	64.75	63.25	65.75	69.25	73.25	73.25
317	37.25	48.25	62.75	72.75	73.50	74.50	77.00	83.75	83.75
321	25.00	32.00	38.25	44.00	44.25	45.25	49.25	54.25	54.25
18-8CbTa	29.25	38.00	45.75	52.25	53.25	53.50	58.00	66.50	66.50
403	....	....	28.75	32.75	....	34.00	36.25	....	44.00
405	17.50	23.00	26.75	31.00	32.25	32.00	33.75	42.25	42.25
410	15.00	19.50	25.50	29.50	28.00	30.50	31.75	36.25	36.25
416	....	....	26.00	30.00	....	31.00	....	....	....
420	23.50	30.25	31.00	36.00	37.75	37.25	40.75	56.00	56.00
430	15.25	19.75	26.00	30.00	28.75	31.00	32.25	36.75	36.75
430F	....	....	26.50	30.50	....	31.50	....	....	....
431	16.00	20.50	26.50	30.50	29.75	31.50	33.00	38.00	38.00
446	....	....	35.50	40.50	53.25	42.00	43.25	63.25	63.25

Stainless Steel Producers Are: Allegheny Ludlum Steel Corp.; Alloy Metal Wire Co. Inc.; Alloy Tube Div., Carpenter Steel Co.; American Steel & Wire Div., U. S. Steel Corp.; Armco Steel Corp.; Babcock & Wilcox Co.; Bethlehem Steel Co.; J. Bishop & Co.; G. O. Carlson Inc.; Carpenter Steel Co.; Charter Wire Products Co.; Cold Metal Products Co.; Crucible Steel Co. of America; Damascus Tube Co.; Wilbur B. Driver Co.; Driver-Harris Co.; Eastern Stainless Steel Corp.; Ellwood Ivins Steel Tube Works Inc.; Firth Sterling Inc.; Ft. Wayne Metals Inc.; Globe Steel Tubes Co.; Helical Tube Co.; Indiana Steel & Wire Co.; Ingersoll Steel Div., Borg-Warner Corp.; Jessop Steel Co.; Johnson Steel & Wire Co. Inc.; Joslyn Mfg. & Supply Co.; Kenmore Metals Corp.; Maryland Fine & Specialty Wire Co.; McLouth Steel Corp.; Metal Forming Corp.; McInnes Steel Co.; National-Standard Co.; National Tube Div., U. S. Steel Corp.; Newman-Crosby Steel Co.; Pacific Tube Co.; Page Steel & Tube Div., American Chain & Cable Co. Inc.; Pittsburgh Rolling Mills Inc.; Republic Steel Corp.; Rodney Metals Inc.; Rome Mfg. Co.; Rotary Electric Steel Co.; Sharon Steel Corp.; Sawhill Tubular Products Inc.; Simonds Saw & Steel Co., Specialty Wire Co. Inc.; Spencer Wire Corp.; Stainless Welded Products Inc.; Standard Tube Co.; Superior Steel Corp.; Superior Tube Co.; Timken Roller Bearing Co.; Trent Tube Co.; Tube Methods Inc.; Ulbrich Stainless Steels; United States Steel Corp.; Universal-Cyclops Steel Co.; Wallingford Steel Co.; Washington Steel Corp.

Clad Steel

	Plates Carbon Base		Sheets Carbon Base
Stainless:	10%	20%	20%
302	....	....	30.50
304	30.30	36.05	32.50
304-L	32.30	37.95	....
310	41.30	47.00	....
316	35.50	41.40	47.00
316-L	40.00	46.10	....
316-CB	41.15	48.45	....
321	32.00	37.75	37.25
347	34.40	41.40	48.25
405	25.80	33.35	....
410	25.30	32.85	....
430	25.30	32.85	....
Inconel	49.45	65.45	....
Nickel	41.05	55.65	....
Nickel, Low Carbon	43.25	60.05	....
Monel	42.35	56.35	....
Copper*	....	....	46.00

	Strip, Carbon Base Cold Rolled 10%	Strip, Carbon Base Cold Rolled Both Sides
Copper*	30.00	38.00

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*Deoxidized. Production points: Stainless-clad sheets, New Castle, Ind. I-4; stainless-clad plates, Claymont, Del. C22, Coatesville, Pa. L7, New Castle, Ind. I-4 and Washington, Pa. J3; nickel, inconel, monel-clad plates, Coatesville L7; copper-clad strip, Carnegie, Pa. S18.

Tool Steel

Grade	$ per lb	Grade	$ per lb
Regular Carbon	0.275	5%Cr Hot Work	0.430-0.460
Extra Carbon	0.330	W-Cr Hot Work	0.450
Special Carbon	0.390	V-Cr Hot Work	0.470
Oil Hardening	0.430	Hi-Carbon-Cr	0.770

Grade by Analysis (%)

W	Cr	V	Co	Mo	$ per lb
20.25	4.25	1.6	12.25	...	4.090
18.25	4.25	1	4.75	...	2.305-2.475
18	4	2	9	...	2.675-2.6775
18	4	2	....	...	1.765
18	4	1	....	...	1.600
13.75	3.75	2	5	...	2.245
13.5	4	3	....	...	1.865
9	3.5	..	....	...	1.180
6	4	2	....	5	1.105
6	4	3	....	6	1.350
1.5	4	1	....	8.5	0.960

Tool steel producers include: A4, A8, B2, B8, C4, C9, C13, C18, D4, F2, J3, M14, S8, U4, V2 and V3.

Pig Iron

F.o.b. furnace prices in dollars per gross ton, as reported to STEEL. Minimum delivered prices are approximate and do not include 3% federal tax.

Birmingham District	Basic	No. 2 Foundry	Malleable	Bessemer
AlabamaCity,Ala. R2	54.50	55.00‡	....	....
Birmingham R2	54.50	55.00‡	....	....
Birmingham U6	....	55.00‡	59.00	....
Woodward,Ala. W15	54.50	55.00‡	59.00	....
Cincinnati, deld.	....	62.70	....	....
Buffalo District				
Buffalo H1, R2	58.50	59.00	59.50	60.00
Tonawanda,N.Y. W12	58.50	59.00	59.50	60.00
N.Tonawanda,N.Y. T9	....	59.00	59.50	60.00
Boston, deld.	69.15	69.65	70.15	....
Rochester,N.Y. deld.	61.52	62.02	62.52	....
Syracuse,N.Y. deld.	62.62	63.12	63.62	....
Chicago District				
Chicago I-3	58.50	59.00	59.00	59.50
Gary,Ind. U5	58.50	....	59.00	....
S.Chicago R2	58.50	....	59.00	....
S.Chicago,Ill. Y1	58.50	59.00	59.00	59.50
S.Chicago,Ill. U5, W14	58.50	....	59.00	59.50
Milwaukee, deld.	60.67	61.17	61.17	61.67
Muskegon,Mich. deld.	....	65.30	65.30	....
Cleveland District				
Cleveland A7, R2	58.50	59.00	59.00	59.50
Akron,O., deld.	61.25	61.75	61.75	62.25
Lorain,O. N3	58.50	....	....	59.50
Mid-Atlantic District				
Bethlehem,Pa. B2	60.50	61.00	61.50	62.00
NewYork, deld.	....	64.78	65.28	....
Newark, deld.	63.52	64.02	64.52	65.02
Birdsboro,Pa. B10	60.50	61.00	61.50	62.00
Chester,Pa. P14	60.50	61.00	61.50	....
Philadelphia, deld.	62.16	62.66	63.16	....
Steelton,Pa. B2	60.50	61.00	61.50	62.00
Swedeland,Pa. A3	60.50	61.00	61.50	62.00
Philadelphia, deld.	62.16	62.66	63.16	63.66
Troy,N.Y. R2	60.50	61.00	61.50	62.00
Pittsburgh District				
NevilleIsland,Pa. P6	58.50	59.00	59.00	....
Pittsburgh (N&S sides), Aliquippa, deld.	....	60.37	60.37	60.87
McKeesRocks, deld.	....	60.04	60.04	60.54
Lawrenceville,Homestead, Wilmerding, Monaca, deld.	....	60.66	60.66	61.16
Verona,Trafford, deld.	60.69	61.19	61.19	61.69
Brackenridge, deld.	60.95	61.45	61.45	61.95
Bessemer,Pa. U5	58.50	....	59.00	59.50
Clairton,Rankin,S.Duquesne,Pa. U5	58.50	....	....	....
McKeesport,Pa. N3	58.50	....	....	59.50
Midland,Pa. C18	58.50	....	....	....

Youngstown District	Basic	No. 2 Foundry	Malleable	Bessemer
Hubbard,O. Y1	....	....	59.00	....
Sharpsville,Pa. S6	58.50	....	59.00	59.50
Youngstown Y1	....	....	59.00	59.50
Youngstown U5	58.50	....	....	59.50
Mansfield,O., deld.	63.40	....	63.90	64.40
Duluth I-3	58.50	59.00	59.00	59.50
Erie,Pa. I-3	58.50	59.00	59.00	59.50
Everett,Mass. E1	62.00	62.50	63.00	....
Fontana,Calif. K1	64.50	65.00	....	....
Geneva,Utah C11	58.50	59.00	....	....
GraniteCity,Ill. G4	60.40	60.90	61.40	....
Ironton,Utah C11	58.50	59.00	....	....
LoneStar,Texas L6	....	55.00*	....	....
Minnequa,Colo. C10	60.50	61.00	61.50	....
Rockwood,Tenn. T3	....	55.00‡	59.00	....
Toledo,O. I-3	58.50	59.00	59.00	59.50
Cincinnati, deld.	64.26	64.76	....	....

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*Phos. 0.51-0.75%; $56, Phos. 0.31-0.50%.

‡Intermediate (Phos. 0.31-0.69%), $56.

PIG IRON DIFFERENTIALS

Silicon: Add 50 cents per ton for each 0.25% Si or percentage thereof over base grade, 1.75-2.25%, except on low phos iron on which base is 1.75-2.00%.

Manganese: Add 50 cents per ton for each 0.50% manganese over 1% or portion thereof.

Nickel: Under 0.05% no extra; 0.50-0.74%, inclusive, add $2 per ton and each additional 0.25%, add $1 per ton.

BLAST FURNACE SILVERY PIG IRON, Gross Ton

(Base 6.00-6.50% silicon; add $1.25 for each 0.5% Si; 75 cents for each 0.50% Mn over 1%)

Jackson,O. G2, J1	$67.50
Buffalo H1	68.75

ELECTRIC FURNACE SILVERY IRON, Gross Ton

(Base 14.01-14.50% silicon; add $1 for each 0.5% Si to 18%; $1 for each 0.50% Mn over 1%; $2 per gross ton premium for 0.045% max P)

NiagaraFalls, N.Y. P15	$91.00
Keokuk,Iowa, (Open-hearth & Fdry, freight allowed K2)	95.50
Keokuk, O.H. & Fdry, 12½ lb piglets, 16% Si, frgt allowed K2	98.50

LOW PHOSPHORUS PIG IRON, Gross Ton

Lyles,Tenn. T3 (Phos. 0.035% max)	$72.50
Rockwood,Tenn. T3 (Phos. 0.0035% max)	72.50
Steelton,Pa. B2 (Phos. 0.035% max)	66.50
Philadelphia, deld.	70.05
Troy,N.Y. R2 (Phos. 0.035% max)	66.50
Cleveland A7 (Intermediate) (Phos. 0.036-0.075% max)	63.50
Duluth I-3 (Intermediate) (Phos. 0.036-0.075% max)	63.50
Erie,Pa. I-3 (Intermediate) (Phos. 0.036-0.075% max)	63.50
Pittsburgh P6 (Intermediate) (Phos. 0.036-0.075% max)	63.50

Warehouse Steel Products

Representative prices, per pound, subject to extras, f.o.b. warehouse. City delivery charges are 25 cents per 100 lb except: Buffalo, Cleveland, Erie, 30 cents; Moline, Norfolk, Richmond, Washington, 20 cents; Birmingham, Chattanooga, Jackson, 15 cents; Baltimore, Boston, Los Angeles, New York, Philadelphia, Portland, San Francisco, 10 cents; Atlanta, Houston, Seattle, Spokane, no charge.

	SHEETS				STRIP		BARS			Standard Structural Shapes	PLATES	
	Hot-Rolled	Cold-Rolled	Gal. 10 Ga.†	Stainless Type 302	H.R.*	C.R.*	H.R. Rds.	C.F. Rds.‡	H.R. Alloy 4140††[5]		Carbon	Floor
Atlanta	7.14	8.20	8.87	....	7.40	...	7.42	9.39	....	7.63	7.49	9.48
Baltimore	7.03	8.32	8.37	....	7.65	...	7.61	8.62[3]	13.44	7.93	7.21	8.87
Birmingham	6.80	7.90	8.85	....	7.06	...	7.08	9.35	.....	7.28	6.99	9.10
Boston	7.70	8.81	10.27	45.67	7.96	...	7.83	9.53	14.45	8.13	7.89	9.36
Buffalo	6.80	8.05	9.77	....	7.15	...	7.10	7.90	13.10	7.40	7.15	8.70
Chattanooga	6.95	8.10	8.60	....	7.20	...	7.20	9.18	....	7.45	7.25	9.05
Chicago	6.80	8.09	8.50	49.05	7.06	...	7.08	7.75	12.85	7.28	6.99	8.46
Cincinnati	6.92	8.08	8.90	46.10	7.30	...	7.32	8.05	13.09	7.75	7.28	8.71
Cleveland	6.80	8.09	8.85	49.16	7.16	...	7.14	7.85	12.91	7.61	7.16	8.63
Detroit	6.99	8.28	8.78	43.50	7.34	...	7.36	8.04	13.05	7.75	7.27	8.65
Erie, Pa.	6.80	7.90	8.85	....	7.15	...	7.08	7.85	....	7.40	7.15	8.63
Houston	7.85	8.75	10.49	....	8.15	...	8.25	9.85	14.00	8.20	7.80	9.20
Jackson, Miss.	7.10	8.20	9.20	....	7.40	...	7.40	9.44	....	7.60	7.45	9.30
Los Angeles	8.05	10.00	11.00	....	8.35	...	8.05	10.70	14.25	8.30	8.05	10.25
Milwaukee	6.89	8.18	8.59	....	7.15	...	7.17	7.94	12.94	7.45	7.08	8.55
Moline, Ill.	7.15	8.44	8.85	....	7.41	...	7.43	8.10	....	7.63	7.34	...
New York	7.46	8.68	9.44	44.95	8.07	...	7.96	9.48	13.28	7.99	7.76	9.19
Norfolk, Va.	7.25	...	...	....	7.65	...	7.65	9.50	....	7.95	7.45	8.95
Philadelphia	7.14	8.42	9.35	45.98	7.67	9.02	7.64	8.46	13.16	7.74	7.37	8.69**
Pittsburgh	6.80	8.09	9.20	49.00	7.16	...	7.08	7.85	12.85	7.28	6.99	8.46
Portland, Oreg.	7.80	8.80	10.65	....	8.00	...	7.95	12.20	15.00	7.85	7.75	9.60
Richmond, Va.	7.00	...	9.47	....	7.65	...	7.70	8.85	....	7.95	7.20	9.10
St. Louis	7.09	8.38	9.19	43.89	7.35	...	7.37	8.14	13.14	7.68	7.28	8.75
St. Paul	7.46	8.59	9.16	....	7.72	...	7.74	8.51	13.51	7.94	7.65	9.12
San Francisco	8.10	9.65	10.15	51.65	8.35	...	8.05	11.20	14.25[3]	8.25	8.05	10.25
Seattle	8.55	10.40	10.80	54.00	8.65	...	8.35	11.70	14.60	8.30	8.20	10.10
Spokane	8.55	11.00[7]	10.80	....	9.05	...	8.35	11.80	15.35	8.30	8.20	10.60
Washington	7.50	8.79	7.97	....	8.12	...	8.08	9.09	....	8.40	7.68	9.34

Prices do not include gage extras; †prices include gage and coating extras (based on 12.50-cent zinc), except in Birmingham (coating extra excluded); ‡includes 35-cent special bar quality extras; **⅛-in. and heavier; ††as annealed; §§under ½-in.

Base quantities, 2000 to 4999 lb except as noted; Cold-rolled strip and cold-finished bars, 2000 lb and over except in Seattle, 2000 to 9999 lb, and in Los Angeles, 6000 lb and over; stainless sheets, 8000 lb except in Chicago, New York and Boston, 10,000 lb, and in San Francisco, 2000 to 4999 lb; hot-rolled products on West Coast, 2000 to 9999 lb; [2]—500 to 9999 lb; [3]—400 to 999 lb; [4]—4000 lb and over; [5]—1000 to 1999 lb; [6]—1000 lb and over; [7]—1500 to 3999 lb; [8]—2000 to 3999 lb; [9]—f.o.b. local delivery in lots of 10,000 lb and over.

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Consumption of Solder by Industries

(Net tons)

Year	Autos, Radiators, etc.	Can Mfrs. & Canning	Coatings	All Others	Total
1955*	25,400	27,300	3,600	63,700	120,000
1954	17,600	25,100	3,500	49,200	95,400
1953	21,800	25,900	2,800	54,500	105,000
1952	21,100	21,100	2,300	51,300	95,800
1951	26,400	20,000	4,200	56,200	106,800
1950	30,000	24,000	4,800	67,400	126,200
1949	18,800	18,900	2,800	42,300	82,800

*Estimated
Source: Lead Industries Association

Despite research aimed at reducing its usage . . .

Solder Eyes New Record

MORE LEAD will go into solder in 1956 than in any other year despite technological developments which someday will reduce or eliminate the use of solder in the two largest consuming industries (see table).

With consumption in 1955 pegged about 26 per cent ahead of 1954's, solder producers this year are expecting to challenge the record of 1950. A 5-per-cent gain would do it. The Lead Industries Association says solder usually follows the pattern of business in general, so if the consensus of metalworking officials holds (see pages 105-112), the record will be set. Lead content of solder is nearly 75 per cent; the lead industry's stake in this market is 93,700 tons.

Strength of Solder—The canning industry will be the mainstay for solder producers again this year. Canmakers expect to set some records themselves, and they see no major shift away from soldered cans in 1956. They point out, however, that most of their research is aimed at less dependence on tin plate.

Practically all oil is packaged in steel cans with cemented seams; detergents come in solderless containers; Florida canners are going to use cemented cans for frozen juice concentrates this year. There is a great deal of research going on with aluminum cans. In fact, one company is reported ready to market an extruded aluminum beer can—long a common container in Germany. Also, there has been considerable research on an aluminum-coated steel can which would have a welded seam. But so far there is no practical substitute for the "tin" can for processed foods. Because most of the increase this year will be in this category, the gains for solder will outweigh the losses, industry officials feel.

One objective in all this research is to get a metal container which can be printed clear around. With the soldered seam, a plain margin must be left. Many can users claim this ruins the display potential of the container.

Experimental Radiators—The automotive industry will continue to fall off the pace in 1956, mostly due to lower production. But all major auto producers are continuing the search for practical production methods and cost reductions for aluminum radiators. Some 1956 models incorporate an aluminum - finned, bronze-tubed radiator, but it is an experiment. Even if the all-aluminum radiator becomes a reality soon, Aluminum Co. of America spokesmen say it may still use about the same amount of solder. It is possible that a high-zinc-content material, free of lead and tin, will be used.

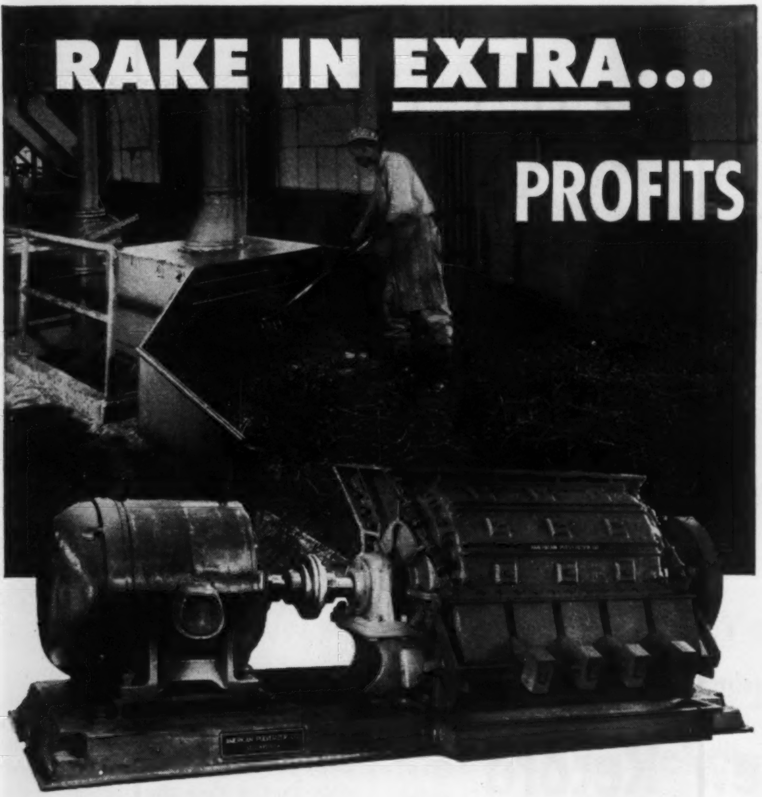
It is significant that the "all-other" classification in the table above shows a substantial increase for 1955. It is likely that it will continue that pace in 1956 and overcome the loss in automotive. One big factor here is electronics.

Automation Helps—As production of radios, television sets and automatic computers increases, use of solder will increase. This is especially true of printed copper circuits. The terrific number of electrical devices required for automation of assembly lines has had a noticeable impact on the use of solder, too.

Although it is hard to measure exact gains, most industry spokesmen feel that the do-it-yourself fad has contributed to this advance in all other uses. Ordinary soldering is one of the easiest tasks for the home workman to tackle.

Balancing the Scale—The Lead Industries Association says there is almost as much research going on to find new and improved uses for solder as there is to eliminate it.

Surface indications to the contrary, industry men are confident that annual consumption of solder will remain above the 100,000-ton mark for the foreseeable future.



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U.S.S. Changes Bar Pricing

Corporation lists two categories of H. R. bars: Special quality and merchant quality

UNITED STATES STEEL Corp. is changing the product classification of its hot-rolled carbon steel bars and altering price schedules on them. The buyer will hardly notice the difference. He will be paying the same price for the same product but will call it by another name.

Two separate product classifications have been set up—special-quality, hot-rolled carbon steel bars and merchant-quality, hot-rolled carbon steel bars.

Formerly, the buyer ordered all hot-rolled carbon bars as merchant quality and paid an extra for special quality. U. S. Steel explains that there has been an increasing demand for hot-rolled bars with properties suitable for improved methods of processing and a growing number of end uses. Technical improvements in the production of carbon steel bars have made it possible to meet these quality requirements.

Price the Same—The price of merchant-quality bars remains at the current level: 4.65 cents a pound at all eastern mills except Fairless Hills, Pa., where it is 4.80 cents a pound, and 5.35 cents a pound at western mills. The new price base for special-quality bars is 0.35 cent above those prices. This is equivalent to the minimum extra charge formerly applied for quality. These revisions apply to Columbia-Geneva Steel Division and to Tennessee Coal & Iron Division and the corporation itself.

Various extras have been revised in both product classifications. These adjustments are both upward and downward and come chiefly in extras for size and chemistry. Related changes in extras are being made for concrete reinforcing bars and carbon rerolling and forging blooms, billets and slabs. In addition, certain extras are being made for alloy steel products. The net result is a small price increase.

Rods, Wire Up — Simultaneously, American Steel & Wire Division, as well as Columbia-Geneva Steel and Tennessee Coal & Iron Divisions, announced related changes in price for hot-rolled carbon steel wire rods and bright basic or bessemer wire.

A price base and a list of extras will be issued soon for these products, the corporation says. These changes were effective at 12:01 a.m., Dec. 23, 1955.

Substitutes Plate Burning by SHEARING ...and Saves Time

Photo SW-654

The electric foot switch, which is standard on all Steelweld Shears, is especially helpful when cutting wide plates, because the switch can be moved to wherever most convenient to reach. Ball bearing stanchions, illustrated, facilitate movement of large sheets into the shear.

A STEELWELD Pivoted-Blade Shear has cut production time considerably at the Youngstown, Ohio, plant of United Engineering and Foundry Co. Formerly, they cut plate by burning, but now the Steelweld shears it so fast that the operator can spend much of his time at other work.

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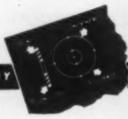

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Steel Bars . . .

Bar Prices, Page 466

Despite the generally sold up condition in bars, cold-finished carbon and alloy bars can still be had for first quarter delivery if mills have hot bar stock on hand. Nickel-free alloy bars also can be obtained for first quarter shipment.

Some mills have not officially opened books for March, and customers don't know exactly what tonnage they will receive that month. New England consumers of hot rolled are unable to place their full requirements for first quarter, but inquiry includes some overestimating for inventory.

Sheets, Strip . . .

Sheet & Strip Prices, Pages 467 & 468

Sheet consumers are still shopping for tonnage. There is some conversion business being done, but relatively few buyers are interested because of the high prices quoted. Imported tonnage is small, and, in the main, consumers are depending upon their regular supply sources.

Of all the flat-rolled products, only galvanized sheets show any semblance of balance between supply and demand in the Midwest, and this is true of all mills. Some producers consider themselves overbooked even though there is more continuous galvanizing capacity now than a year ago. Some uses of galvanized sheets are seasonal. Were it not for that fact, this product would be difficult to obtain.

While there are openings for March shipment tonnage on cold-rolled carbon strip, New England users of flat-rolled in other categories are up against a blank wall in seeking additional first quarter tonnage. Depending on carry-overs, most mills have booked new orders for February and March delivery, but in reduced tonnage from the previous order pattern. In most cases, buyers will get about enough steel to maintain manufacturing schedules at present levels. Three Pittsburgh area producers will be virtually out of the hot-rolled sheet market in the first quarter, their only shipment of this product in the period being delayed deliveries from fourth quarter.

Some of the auto builders are cutting back their production schedules, but this is not likely to be reflected in the sheet market at mill level for some weeks. In fact, trade opinion is that auto orders will not likely begin to decline before the second quarter, and some observers think orders may not fall off before midyear

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¾ to 1	11 thru 22	⅜ minimum
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2 to 3	11 thru 18	maximum side

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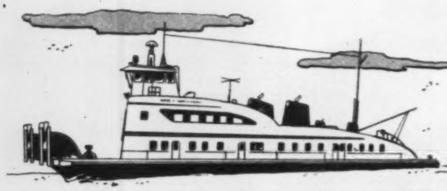

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because of possible steel supply difficulties should steel wage negotiations at midyear become snagged.

Wire . . .

Wire Prices, Pages 468 & 469

The holidays brought some letup in pressure on the wire mills, but, indications are, strong demand will continue to be entertained throughout the first quarter. This is especially true of manufacturers wire, but a seasonal pickup in merchant products trade is expected as the quarter advances.

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Most producers anticipate full operations in the first half of the year, with good business being entertained beyond that period. Right now fabricators of large diameter welded pipe are reported booked up solidly through early fall. Several pipeline projects in Canada have been mapped out for 1956.

New England tank shops, and other fabricators using heads, can get delivery ahead of plates, four to eight weeks. Plate mills booking on a monthly basis are filled up for February and have orders in sight extending into the second quarter, openings in schedules being held for car builders' requirements, for welded pipe and semirated needs.

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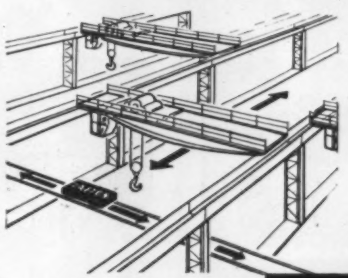

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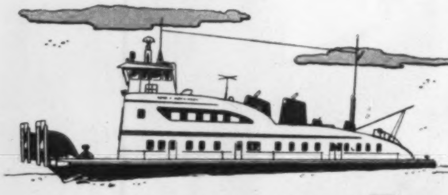

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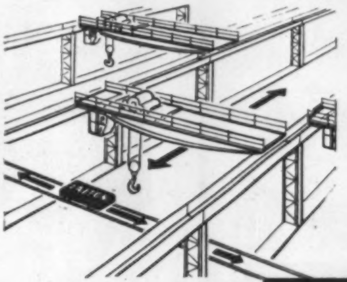

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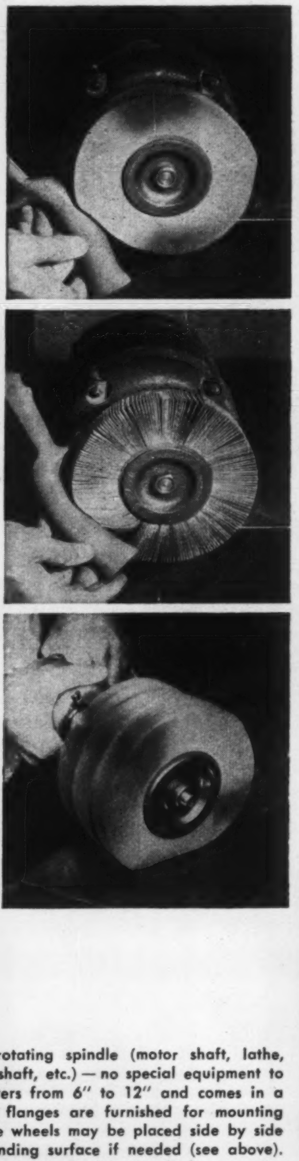

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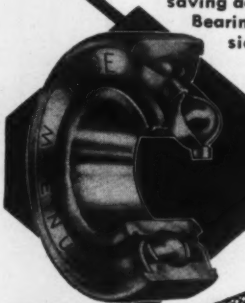
Product Designers will find many cost saving advantages in the use of NICE Ball Bearings. NICE precision, semi-precision and unground bearings are designed to provide the functionally and economically correct answer to most application problems.



WRITE FOR
CATALOG NO. 150

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up to 6,000 lbs. each

ALL TYPES

Smooth Forged — Rough Turned
Finished — Hollow Bored
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Roll—Gear Blanks—Pinions and Miscellaneous Forgings

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order from the smallest to the largest

Excellent facilities for pickling and oiling

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2523 E. Cumberland Street Philadelphia 25, Pa.

erations through the first half of the year. In fact, they look for heavy volume business all year long. Oil, chemical and gas industry requirements will be heavy. Freight car needs will take large tonnage, and the outlook for demand from the construction industry is promising.

Stainless Steel . . .

Stainless Steel Prices, Page 470

One producer of stainless steel in the Pittsburgh area reports its 1955 allotments of nickel would have been exhausted in December had it not been for the co-operation of customers in substituting chrome-manganese grades for nickel-bearing in many applications.

Tubular Goods . . .

Tubular Goods Prices, Page 470

Contracts have been placed for the proposed $150-million, 650-mile natural gas pipeline from the Peace river area, British Columbia, to the Pacific coast, according to Canadian Bechtel Ltd., agents for the Westcoast Transmission Co.

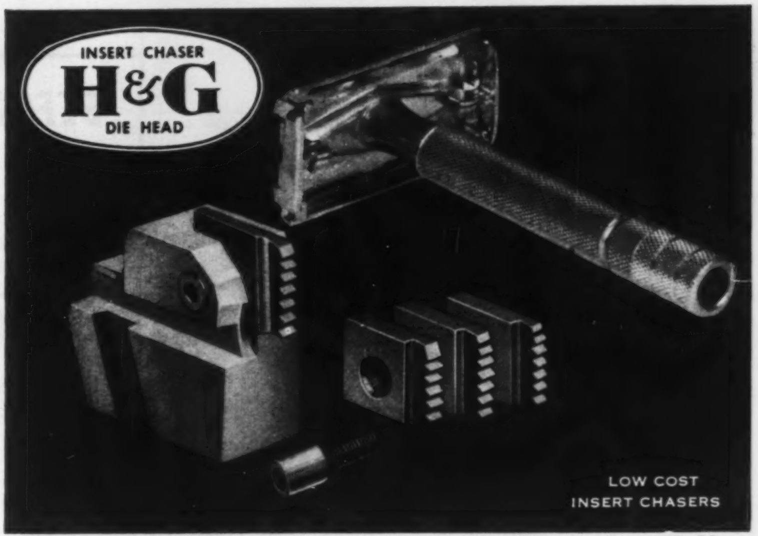
Dutton, Williams Bros. Ltd., Calgary, Can., will construct the northern section. Other contracts went to Canadian Bechtel Ltd., R. A. Gonyea Construction Co., San Pablo, Calif., and Mannix Ltd., Calgary.

Line capacity will be 600 million cubic feet daily. Completion is scheduled for early 1957. In addition, an $8-million processing plant will be erected in the Ponce Coupe area to recover 300 tons of sulphur daily.

Pacific Lighting Corp. subsidiaries have filed an amended application with California for authority to build a 236-mile pipeline from Topock, Ariz., to Newhall, Calif. It will be a 30-in. line costing $23.6 million.

Oil country goods producers are optimistic about 1956 business. They are confident of a steady growth in demand over the next ten years. They point to indicated steady rise in drill pipe needs as well drillers develop new resources. More deeper wells will be sunk with each succeeding year, it is said, requiring ever growing tonnages of drill pipe.

Jones & Laughlin Steel Corp. reports a Port Sulphur, La., well reached a world's record depth of 22,559 ft without striking oil. About 383 tons of J & L casing were used in that hole alone, and there's speculation that the drillers may go down to 25,000 or 27,000 ft.



FOR LESS THAN $40 YOU GET 12 SETS, EACH SET GROUND READY TO GO

Men would not accept either idea at first . . .

INSERT CHASERS SAVE UP TO 33%

Insert chasers are like safety razor blades: they cost so little that you can throw them away when dull. Or, for utmost economy, you can resharpen them over and over again. Only a flash grind is required. For less than $40 you get a dozen sets of ¾–16 insert chasers, each set ground ready to go. You will be amazed at the quantity of threads they will cut, even to Class 3 specifications, with a minimum of downtime.
FREE: "Selecting the Proper Die Head for the Job"

THE EASTERN MACHINE SCREW CORPORATION 22-42 Barclay St., New Haven, Conn.

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1 Lifter Handles Both Wide and Narrow Coils With Same Speed and Economy

This C-F Coil Lifter, under control of the Crane operator handles hundreds of coils a day in a large mill . . . wide, narrow, and of varying tonnage. Fast, infinite adjustments of the motorized legs permit quick pick-up and set-down. Legs can be opened to any width and held . . . no need to open to maximum width to handle narrow coil. Maximum of 12" required between coils of any width—saves storage room.

Positive tong grip on coil tightens as lift is made . . . insures safe handling. Made in motorized models for crane cab or pendant operation as well as manual types with chain wheel, in capacities from 3 tons up. Powered Rotating Heads available. Opening ranges to suit your requirements. Write for Bulletin and complete information.

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PRECISION GROUND • INTERCHANGEABLE •
WEAR AND SHOCK RESISTANT • REPLACEABLE.
Many other uses, wherever rolling or sliding wear is concentrated.
Get the latest literature, or send sketches of your requirements to:

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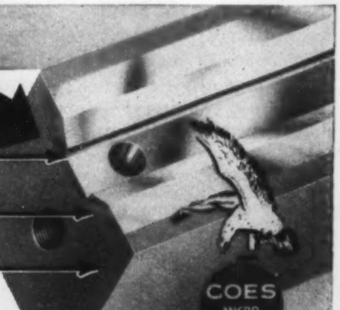

COES KNIFE COMPANY, Worcester, Mass.- Est. 1830

Current Ferroalloy Quotations

MANGANESE ALLOYS

Spiegeleisen: Carlot, per gross ton, Palmerton, Pa. 21-23% Mn, $94; 19-21% Mn, 1-3% Si, $91.50; 16-19% Mn, $89.50.

Standard Ferromanganese: (Mn 74-76%, C 7% approx.) Base price per net ton $190, Clairton, Duquesne, Johnstown Pa.; Philo, O.; Tacoma, Wash.; $205, Sheridan, Pa.; Aloy, W. Va.; Ashtabula, Marietta, O.; Sheffield, Ala.; Portland, Oreg. Add or subtract $2.000 for each 1% or fraction thereof of contained manganese over 76% or under 74%, respectively.

(Mn 79-81%). Lump $198 per net ton, f.o.b. Anaconda or Great Falls, Mont. Add $2.60 for each 1% above 81%; subtract $2.60 for each 1% below 76%, fractions in proportion to nearest 0.1%.

Low-Carbon Ferromanganese, Regular Grade: (Mn 85-90%). Carload, lump, bulk, max. 0.07% C, 30.95c per lb of contained Mn. carload packed 32c, ton lots 33.5c, less ton 34.7c. Delivered. Deduct 1.5c for max 0.15% C grade from above prices, 3c for max 0.30% C, 3.5c for max 0.50% C, and 6.5c for max 75% C—max 7% Si. **Special Grade:** (Mn 90% min, C 0.07% max, P 0.06% max). Add 2.05c to the above prices. Spot, add 0.25c.

Medium-Carbon Ferromanganese: (Mn 80-85%, C 1.25-1.5%, Si 1.5% max). Carload, lump, bulk 22.35c per lb of contained Mn, packed, carload 23.45c, ton lot 25c, less ton 26.2c. Delivered. Spot, add 0.25c.

Manganese Metal: 2" x D (Mn 95.5% min, Fe 2% max, Si 1% max, C 0.2% max): Carload, lump, bulk, 45c per lb of metal; packed, 45.75c; ton lot 47.25c; less ton lots 49.25c. Delivered. Spot, add 2c.

Electrolytic Manganese Metal: Min carload, 30c; 2000 lb to min carload, 32c; 250 lb to 1999 lb 34c. Premium for hydrogen-removed metal, 0.75c per lb. Prices are f.o.b. cars, Knoxville, Tenn., freight allowed to St. Louis or to any point east of Mississippi; or f.o.b. Marietta, O., freight allowed.

Silicomanganese: (Mn 65-68%). Contract, lump, bulk 1.50% C grade, 18-20% Si, 11.5c per lb of alloy. Packed, c.l. 12.5c, ton 12.95c, less ton 13.95c, f.o.b. Alloy, W. Va., Ashtabula, O., Marietta, O., Sheffield, Ala., Portland, Oreg. For 2% C grade, Si 15-17%, deduct 0.2c from above prices. For 3% C grade, Si 12-14.5%, deduct 0.4c from above prices. Spot, add 0.25c.

TITANIUM ALLOYS

Ferrotitanium, Low-Carbon: (Ti 20-25%, Al 3.5% max, Si 4% max, C 0.10% max). Contract, ton lots 2" x D, $1.50 per lb of contained Ti; less ton $1.55. (Ti 38-43%, Al 8% max, Si 4% max, C 0.10% max). Ton lots $1.35, less ton $1.37 f.o.b. Niagara Falls, N.Y., freight allowed to St. Louis. Spot, add 5c.

Ferrotitanium, High-Carbon: (Ti 15-18%, C 6-8%). Contract $177 per ton, f.o.b. Niagara Falls, N. Y., freight allowed to destinations east of Mississippi river and north of Baltimore and St. Louis.

Ferrotitanium, Medium-Carbon: (Ti 17-21%, C 2-4.5%). Contract $195 per ton, f.o.b. Niagara Falls, N. Y., freight not exceeding St. Louis rate allowed.

CHROMIUM ALLOYS

High-Carbon Ferrochrome: Contract, c.l., lump, bulk 26.25c per lb of contained Cr; c.l. packed 27.5c, ton lot 29.25c, less ton 30.65c. Delivered. Spot, add 0.25c.

Low-Carbon Ferrochrome: (Cr 67-71%). Contract, carload, lump, bulk, C 0.025% max (Simplex) 31.75c per lb contained Cr, 0.02 max 38.50c, 0.03% max 38c, 0.06% max 36.50c 0.1% max 36c, 0.15% max 35.75c 0.2% max 35.50c, 0.5% max 35.25c, 1.0% max 34c, 1.5% max 33.85c, 2.0% max 33.75c. Ton lot, add 3.1c, less ton add 4.8c. Carload packed add 1.45c. Delivered. Spot, add 0.25c.

Foundry Ferrochrome, High-Carbon: (Cr 62-66%, C 5-7%, Si 7-10%). Contract, c.l. 8 M x D, bulk 27.4c per lb contained Cr. Packed c.l. 28.7c, ton 30.5c, less ton 32c. Delivered. Spot, add 0.25c.

Foundry Ferrochrome, Low-Carbon: (Cr 50-54%, Si 28-32%, C 1.25% max). Contract, carload, packed 8 M x D, 19.6c per lb of alloy, ton lot 20.85c; less ton lot, 22.05c. Delivered. Spot, add 0.25c.

Low-Carbon Ferrochrome-Silicon: (Cr 34-41%, Si 42-49%, C 0.05% max). Contract, carload, lump, 4" x down and 2" x down, bulk, 39.05c per lb of contained Cr; 1" x down, bulk 39.8c. Delivered.

Chromium Metal, Electrolytic: Commercial grade (Cr 99.2% min, Fe 0.2 max). Contract, carlot, packed 2"x D plate (about ⅛" thick) $1.25 per lb, ton lots $1.27, less ton lots $1.28. Delivered. Spot, add 5c.

VANADIUM ALLOYS

Ferrovanadium: Open-hearth Grade (V 50-55%, Si 8% max, C 3% max). Contract, any quantity, $3.10 per lb of contained V. Delivered. Spot, add 10c. **Special Grade** (V 50-55% or 70-75%, Si 2% max, C 0.5% max) $3.20. **High Speed Grade** (V 50-55%, or 70-75%, Si 1.50% max, C 0.20% max) $3.30.

Grainal: Vanadium Grainal No. 1, $1.05 per lb; No. 6, 68c; No. 79, 50c, freight allowed.

Vanadium Oxide: Contract, less carload lots, packed, $1.33 per lb contained V_2O_5, freight allowed. Spot, add 5c.

SILICON ALLOYS

25-30% Ferrosilicon: Contract, carload, lump, bulk, 20.0c per lb of contained Si, Packed 21.40c; ton lot 22.50c f.o.b. Niagara Falls, freight not exceeding St. Louis rate allowed.

50% Ferrosilicon: Contract, carload, lump, bulk, 12.75c per lb of contained Si. Packed, c.l. 14.85c, ton lot 16.3c, less ton 17.95c. F.o.b. Alloy, W. Va., Ashtabula, O., Marietta, O., Sheffield, Ala., and Portland, Oreg. Spot, add 0.45c.

Low-Aluminum 50% Ferrosilicon: (Al 0.40% max). Add 1.2c to 50% ferrosilicon prices.

65% Ferrosilicon: Contract, carload, lump, bulk, 14.5c per pound contained silicon. Packed, c.l. 16.2c, ton lots, 18c; less ton, 19.35c. Delivered. Spot, add 0.35c.

75% Ferrosilicon: Contract, carload, lump, bulk, 15.4c per lb of contained Si. Packed c.l. 17.05c, ton lot 18.7c, less ton 19.95c. Delivered. Spot, add 0.3c.

90% Ferrosilicon: Contract, carload, lump, bulk, 18.5c per lb of contained Si. Packed, c.l. 19.95c, ton lot 21.35c, less ton 22.4c. Delivered. Spot, add 0.25c.

Silicon Metal: (Min 98% Si, 0.75% max Fe, 0.07 max Ca). C.l. lump, bulk, 20.5c per lb of Si. Packed, c.l. 21.95c, ton lot 23.25c, less ton 24.25c. Add 0.5c for max 0.03 Ca grade. Deduct 0.5c for max 2% Fe grade analyzing min 96.5% Si. Spot, add 0.25c.

Alsifer: (Approx, 20% Al, 40% Si, 40% Fe). Contract, basis f.o.b. Niagara Falls, N. Y., lump, carload, bulk, 10.65c per lb of alloy, ton lots packed 11.8c.

ZIRCONIUM ALLOYS

12-15% Zirconium Alloy: (Zr 12-15%, Si 39-43%, C 0.20% max). Contract, c.l. lump, bulk 8.5c, per lb of alloy. Packed, c.l. 9.5c, ton lot 10.65c, less ton 11.5c. Delivered. Spot, add 0.25c.

35-40% Zirconium Alloy: (Zr 35-40%, Si 47-52%, Fe 8-12%, C 0.50% max). Contract, carload, lump, packed 26.25c per lb of alloy, ton lot 27.4c, less ton 28.65c. Freight allowed. Spot, add 0.25c.

BORON ALLOYS

Ferroboron: (B 17.50% min, Si 1.50% max, Al 0.50% max, C 0.50% max). Contract, 100 lb or more 1" x D. $1.20 per lb of alloy; less than 100 lb $1.30. Delivered. Spot, add 5c. F.o.b. Washington, Pa., prices, 100 lb and over, are as follows: Grade A (10-14% B) 85c per pound; Grade B (14-18% B) $1.20; Grade C (19% min B) $1.50.

Borosil: (3 to 4% B, 40 to 45% Si). $5.25 per lb contained B, delivered to destination.

Bortam: (B 1.5%-1.9%). Ton lots, 45c per lb; smaller lots, 50c per lb.

Carbortam: (B 1 to 2%). Contract, lump, carloads 9.50c per lb, f.o.b. Suspension Bridge, N. Y., freight allowed same as high-carbon ferrotitanium.

CALCIUM ALLOYS

Calcium-Manganese-Silicon: (Ca 16-20%, Mn 14-18% and Si 53-59%). Contract, carload, lump, bulk 22c per lb of alloy, carload packed 23.05c, ton lot 24.95c, less ton 25.95c. Delivered. Spot, add 0.25c.

Calcium-Silicon: (Ca 30-33%, Si 60-65%, Fe 1.5-3%). Contract, carload, lump, bulk 21.5c per lb of alloy, carload packed 22.95c, ton lot 25.25c, less ton 26.75c. Delivered. Spot, add 0.25c.

BRIQUETTED ALLOYS

Chromium Briquets: (Weighing approx. 3⅜ lb each and containing exactly 2 lb of Cr). Contract, carload, bulk, 16.95 per lb of briquet, carload packed in box pallets 17.15c, in bags 17.85c; 3000 lb to c.l. in box pallets 18.35c; 2000 lb to c.l. in bags, 19.05c; less than 2000 lb in bags 19.95c. Delivered. Add 0.25c for notching. Spot, add 0.25c.

Ferromanganese Briquets: (Weighing approx. 3 lb and containing exactly 2 lb of Mn). Contract, carload, bulk 12.5c per lb of briquet, c.l. packed, pallets 12.7c, bags 13.5c; 3000 lb to c.l., pallets 13.9c; 2000 lb to c.l., bags, 14.7cc, less ton 15.6c. Delivered. Add 0.25c for notching. Spot, add 0.25c.

Silicomanganese Briquets: (Weighing approx. 3½ lb and containing exactly 2 lb of Mn and aprox. ½ lb of Si). Contract, c.l. bulk 13.5c per lb of briquet, c.l. packed, pallets, 13.35c; bags 14.15c, 3000 lb to c.l., pallets, 14.55c; 2000 lb to c.l., bags, 15.35c; less ton 16.25c. Delivered. Add 0.25c for notching. Spot, add 0.25c.

Silicon Briquets: (Large size—weighing approx. 5 lb and containing exactly 2 lb of Si). Contract carload, bulk 7.15c per lb of briquet; packed, pallets, 7.35c; bags, 8.15c; 3000 lb to c.l., pallets, 8.95c; 2000 lb to c.l. bags 9.75c; less ton 10.65c. Delivered. Spot, add 0.25c.

(Small size—Weighing approx. 2½ lb and containing exactly 1 lb of Si). Carload, bulk 7.3c. Packed, pallets 7.5c; bags 8.34c; 3000 lb to c.l. pallets 9.1c; 2000 to c.l. bags 9.9c; less ton 10.8c. Delivered. Add 0.25c for notching, small size only. Spot, add 0.25c.

Molybdic-Oxide Briquets: (Containing 2½ lb of Mo each) $1.33 per pound of Mo contained, f.o.b. Langeloth, Pa.

TUNGSTEN ALLOYS

Ferrotungsten: (70-80%), 5000 lb W or more $3.30 per lb of contained W; 2000 lb W to 5000 lb W, $3.40; less than 2000 lb W, $3.52 Delivered.

OTHER FERROALLOYS

Ferrocolumbium: (Cb 50-60%, Si 8% max, C 0.4% max). Contract, ton lot, 2" x D. $6.90 per lb of contained Cb. Delivered. Spot add 10c.

Ferrotantalum—Columbium: (Cb 40% approx., Ta 20% approx., and Cb plus Ta 60% min C 0.30% max). Ton lots, 2" x D, $4.65 per lb of contained Cb plus Ta, delivered; less ton lots $4.70.

Silicaz Alloy: (Si 35-40%, Ca 9-11%, Al 6-8%, Zr 3-5%, Ti 9-11%, B 0.55-0.75%). Carload packed 1" x D, 45c per lb of alloy, ton lot 47c, less ton 49c. Delivered.

SMZ Alloy: (Si 60-65%, Mn 5-7%, Zr 5-7%, Fe 20% approx.) Contract, c.l. packed ½ in. x 12 M, 18.5c per lb of alloy, ton lots 19.65c, less ton 20.9c. Delivered. Spot, add 0.25c.

Graphidox No. 5: (Si 48-52%, Ca 5-7%, Ti 9-11%). C.l. packed, 18.5c per lb of alloy, ton lots 19.65c; less ton lots 20.9c, f.o.b. Niagara Falls, N. Y.; freight allowed to St. Louis.

V-5 Foundry Alloy: (Cr 38-42%, Si 17-19%, Mn 8-11%). C.l. packed 17.2c per lb or alloy; ton lots 18.7c; less ton lots 19.95c, f.o.b. Niagara Falls; freight allowed to St. Louis.

Siminal: (Approx. 20% each Si, Mn, Al; bal. Fe). Lump, carload, bulk 16.50c. Packed c.l. 17.50c, 2000 lb to c.l. 18.50c, less than 2000 lb 19c per lb of alloy. Delivered.

Ferrophosphorus: (23-25% based on 24% P content with unitage of $4 for each 1% of P above or below the base; carload, f.o.b. sellers' works, Mt. Pleasant, Siglo, Tenn., $90 per gross ton.

Ferromolybdenum: (55-75%). Per lb contained Mo, in 200-lb containers, f.o.b. Langeloth, Pa., $1.54 in all sizes except powederd which is $1.66; Washington, Pa., furnace, any quantity $1.46.

Technical Molybdic-Oxide: Per lb contained Mo. f.o.b. Langeloth, Pa.; $1.31 in cans; in bags, $1.30, f.o.b. Langeloth, Pa.; $1.24, Washington, Pa.

KEYSEATING

The Modern Way

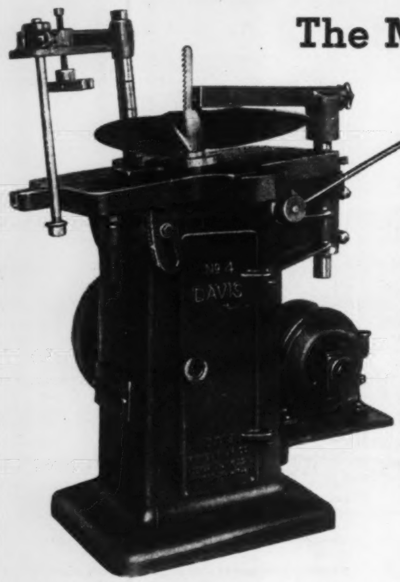

Illustration shows typical set-up for cutting taper keyways with table tilted.

Machines are made in three sizes for keyways 1/16" to 1" in width.

Great simplicity and ease of operation of Davis Keyseater, assure the user of accurate, time saving work.
Let our engineer study your keyseating problems.

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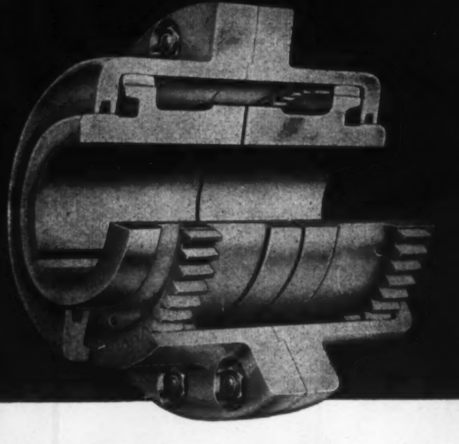

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So many standard styles. . . . . . .

. . . . *one must be just right for you!*

For more than 67 years we have been producing metal-working tools and adding to our standard line. Today we keep such an extensive range of styles and sizes of PUNCHES and DIES on hand that we can fit most makes of punch presses from stock. The tools you need are *immediately available* when you need them—at regular *low*, standard prices.

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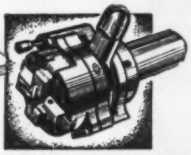
310 East 47th Street, New York 17, N. Y.

H&G Insert Chaser DIE HEADS

famous for accuracy and straightness of threads, low chaser costs, less downtime, more pieces per day.



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TRAVELING CRANES AND HOISTS
up to 125-TON CAPACITY

VICTOR R. BROWNING & CO., INC. • WILLOUGHBY (Cleveland), OHIO

DYKEM
STEEL BLUE
Stops Losses
making Dies and Templates

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STEEL BLUE
SPECIMEN
With DYKEM Steel Blue
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Popular package is 8-oz can fitted with Bakelite cap holding soft-hair brush for applying right at bench. metal surface ready for layout in a few minutes The dark blue background makes the scribed lines show up in sharp relief prevents metal glare Increases efficiency and accuracy

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PERFORATED METALS
TO YOUR REQUIREMENTS
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DIAMOND MFG. CO.
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Ores

Lake Superior Iron Ore

(Prices effective for the 1956 shipping season. gross ton, 51.50% iron natural, rail of vessel, lower lake ports)

Old range bessemer	$11.25
Old range nonbessemer	11.10
Mesabi bessemer	11.10
Mesabi nonbessemer	10.95
Open-hearth lump	12.10

Eastern Local Iron Ore

Cents per unit, deld. E. Pa.

Foundry and basic 52-62% concentrates contract	17.00-18.00

Foreign Iron Ore

Cents per unit, c.i.f. Atlantic ports

Swedish basic, 60-68%	20.00
N. African hematite (spot)...nom.	18.00-20.00
Brazilian iron ore, 68-69% (spot)	26.00-28.00

Tungsten Ore

Net ton unit, before duty

Foreign, wolframite, good commercial quality	$30.00-$31.00
Domestic, scheelite, mine	63.00

Manganese Ore

Mn 48%, nearby, $1.06-$1.11 per long ton unit, c.i.f. U. S. ports, duty for buyer's account; 46-47%, 95c-$1.00.

Chrome Ore

Gross ton, f.o.b. cars New York, Philadelphia, Baltimore, Charleston, S. C., plus ocean freight differential for deliver to Portland, Oreg., Tacoma, Wash.

Indian and African

48% 2.8:1 ...nom.	$45.00-$50.00
48% 3:1	42.00-44.00
48% no ratio	34.00

South African Transvaal

44% no ratio	$19.00-$20.00
48% no ratio	33.00-35.00

Domestic

Rail nearest seller

18% 3:1	$39.00

Molybdenum

Sulphide concentrate, per lb of Mo content, mines, unpacked	$1.00

Antimony Ore

Per unit of Sb content, c.i.f. seaboard

55-60%	$3.60-$3.85
60-65%	3.85-4.00

Vanadium Ore

Cents per lb V_2O_5 content, deld. mills

Domestic	31.00

Refractories

Fire Clay Brick (per 1000)

High-Heat Duty: Ashland, Grahn, Hayward, Hitchins, Haldeman, Olive Hill, Ky., Athens, Troup, Tex., Beech Creek, Clearfield, Curwensville, Lock Haven, Lumber, Orviston, West Decatur, Pa., Bessemer, Ala., Farber, Mexico, St. Louis, Vandalia, Mo., Ironton, Oak Hill, Parral, Portsmouth, O., Ottawa, Ill., Stevens Pottery, Ga., $122; Salina, Pa., $127; Niles, O., $133.

Super-Duty: St. Louis, $150.

Silica Brick (per 1000)

Standard: Alexandria, Claysburg, Mt. Union, Sproul, Pa., Ensley, Ala., Portsmouth, O., Hawstone, Pa., $128; Warren, Niles, O., Hays, Pa., $133; Morrisville, Pa., $131.50; E. Chicago, Ind., Joliet, Rockdale, Ill., $138; Lehigh, Utah, $144; Los Angeles, $151.

Super Duty: Hays, Sproul, Hawstone, Pa., Warren, Windham, O., Athens, Tex., $145; Morrisville, Pa., Niles, O., $148; Joliet, Ill., $151; Curtner, Calif., $163.

Semisilica Brick (per 1000)

Clearfield, Pa., $139; Philadelphia, $124; Woodbridge, N. J., $122.

Ladle Brick (per 1000)

Dry Pressed: Alsey, Ill., Chester, New Cumberland, W. Va., Freeport, Johnstown, Merrill Station, Pa., Mexico, Vandalia, Mo., $88.50; Wellsville, O., $92.50; Clearfield, Pa., Portsmouth, O., $98.

High-Alumina Brick (per 1000)

50 *Per Cent:* St. Louis, Mexico, Mo., $194; Danville, Ill., $197; Philadelphia, Clearfield, Pa., $201.

60 *Per Cent:* St. Louis, Mexico, Vandalia, Mo., $241; Danville, Ill., $244; Philadelphia, Clearfield, Pa. $248.

70 *Per Cent:* St. Louis, Mexico, Vandalia, Mo., $279; Danville, Ill., $281; Clearfield, Pa., Philadelphia, $286.

Sleeves (per 1000)

Reesdale, Johnstown, Bridgeburg, Pa., $157; Clearfield, Pa., $158.50; St. Louis, $169.30.

Nozzles (per 1000)

Reesdale, Pa., $253.70; Johnstown, Pa., $259.20; Clearfield, Pa., $259.40; St. Louis, $259.45; Bridgeburg, Pa., $258.

Runners (per 1000)

Reesdale, Johnstown, Bridgeburg, Pa., $196; Clearfield, Pa., $198; St. Louis, $195.80.

Dolomite (per net ton)

Domestic, dead-burned bulk, Billmeyer, Blue Bell, Williams, Plymouth Meeting, York, Pa., Millville, W. Va., Bettsville, Millersville, Martin, Woodville, O., Gibsonburg, Narlo, O., $15; Thornton, McCook, Ill., $15.60; Dolly Siding, Bonne Terre, Mo., $14.

Magnesite (per net ton)

Domestic, dead-burned, bulk, ½-in. grains with fines: Chewelah, Wash., $40; Luning, Nev., $40. ⅝-in. grains with fines: Baltimore, $66.40.

Metallurgical Coke

Price per net ton

Beehive Ovens

Connelsville, furnace	$13.75-14.50
Connellsville, foundry	16.00-17.00

Oven Foundry Coke

Kearney, N. J., ovens	$26.75
Camden, N. J., ovens	26.50
Everett, Mass., ovens	
New England, deld.	*28.55
Chicago, ovens	27.00
Cincinnati, deld.	28.50
Terre Haute, Ind., ovens	26.75
Milwaukee, ovens	27.50
Indionpolis, ovens	26.75
Portsmouth, O., ovens	24.75
Cincinnati, deld.	27.34
Painesville, O., Ovens	27.50
Cleveland, deld.	29.43
Birmingham, ovens	24.40
Cincinnati, deld.	29.33
Erie, Pa., ovens	27.50
Buffalo, ovens	27.50
Buffalo, deld.	28.75
Lone Star, Tex., ovens	19.50
Neville Island, (Pittsburgh) Pa., ovens	25.00
Philadelphia, ovens	26.50
Swedeland, Pa., ovens	26.50
St. Paul, ovens	26.50
Detroit, ovens	27.50
Detroit, deld.	28.50
Pontiac, deld.	29.06
Saginaw, deld.	30.58

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*Or within $4.55 freight zone from works.

Coal Chemicals

Spot, cents per gallon, ovens

Pure benzene	36.00
Toluene, one deg.	32.00-34.00
Industrial xylene	32.00-35.00

Per ton, bulk, ovens

Ammonium sulphate	$42-$45
Birmingham area	42.00†

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†With port equalization against imports.

Cents per pound, producing point

Phenol: Grade 1, 15.00; Grade 2-3, 14.50; Grade 4, 16.50; Grade 5, 15.25.

Fluorspar

Metallurgical grades, f.o.b. shipping point, in Ill., Ky., net tons, carloads, effective CaF_2 content 72.5%, $38-$39; 70%, $35-$36; 60%, $31-$32. Imported, net tons, f.o.b. cars point of entry, duty paid, metallurgical grade: European, $34; Mexican, $26.50.

Electrodes

Threaded with nipple, unboxed, f.o.b. plant

Inches		Per
Diam	Length	100 lb
	GRAPHITE	
2	24	$52.50
2½	30	33.75
3	40	32.00
4	40	30.25
5½	40	30.00
6	60	27.25
7	60	26.75
8, 9, 10	60	24.25
12	72	27.25
14	60	23.50
16	72	22.50
17	60	23.00
18	72	22.50
20	72	22.25
	CARBON	
8	60	12.10
10	60	11.80
12	60	11.75
14	60	11.70
14	72	10.85
17	60	10.75
17	72	10.35
20	84	10.30
20	90	10.10
24	72, 84	10.30
24	96	10.05
30	84	10.20
40, 35	110	9.90
40	100	9.90

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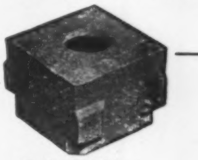
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IMPORT & EXPORT — **LIVINGSTON & SOUTHARD, INC.,** *99 Park Ave., New York, N. Y. • Cable Address:* **FORENTRACO**

Scrap . . .

Scrap Prices, Page 488

New York—Brokers' buying prices are nominally higher at $48-$50 for No. 1 heavy melting steel and No. 1 bundles; $44-$46 for No. 2 heavy melting; and $39-$41 for No. 2 bundles.

Philadelphia—U. S. Steel Corp.'s Fairless mill purchased a sizable tonnage of open-hearth steel scrap at slightly higher prices. This buyer is reported to have paid $55, delivered, for No. 1 heavy melting, No. 1 bundles and No. 1 busheling; $49 for No. 2 heavy melting; and $46 for No. 2 bundles.

This purchase has forced the market on electric furnace bundles to $56, delivered, and will undoubtedly have a stiffening influence on other grades. Machine shop turnings are $36-$37; mixed borings and turnings, $37; low phos structurals and plate, $55-$57—the outside price applying on material 2 ft and under. Couplers, springs and wheels are higher at $56-$57, and rail crops (2-ft and under) $66. No. 1 cupola cast is higher at $50-$51, and drop broken machinery $57-$58.

Pittsburgh — Some purchasing agents think scrap prices have about reached their peak. Sensitive to trends, the market is thought likely to react quickly to any slackening in automative steel requirements that may develop.

The leading mill consumer here paid $50 for No. 1 heavy melting on its last purchase. This was a small buy, but it increased speculation on the future market trend. It did not establish the market firmly at $50. The trade continues to resist purchase offers below $52 or $53. Some emergency requests are reported being filled at $54.

Chicago — Purchases of leading grades of steelmaking scrap by a large mill and announcement of prices it is willing to pay for other grades has been a stabilizing influence on the market. Prices are $1 to $2 less than the trade had been indicating. A considerable tonnage of No. 1 railroad heavy melting was acquired at $54. Prices on other grades are in proportion—for example, No. 1 factory bundles, $54; No. 1 industrial heavy melting, $51; and No. 2 heavy melting, $42. An offer of $70 for rerolling rails apparently did not attract any buying interest.

St. Louis—Railroad scrap prices are up 50 cents on angles and splice bars, and $3.50 on random length rails. One hundred cars of heavy melting steel went at $55 on track, up $1, at Missouri-Pacific's monthly scrap sale. Heavy breakable cast is quoted $1 higher, brake shoes, $2 per ton higher.

Los Angeles—In erratic year-end adjustments, machine shop turnings advanced to $18 per ton, while No. 2 bundles declined $2 to $33. No. 1 cupola cast reflected the firm undertone of the cast scrap market by advancing $3 to $45-$48.

Seattle — Some 100,000 tons of scrap were exported from the Pa-

(*Please turn to page* 490)

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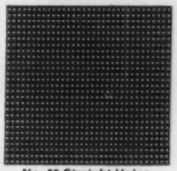

No. 00 Straight Holes
952 holes per sq. in.
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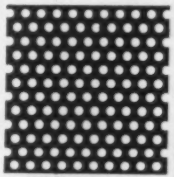

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126 holes per sq. in.
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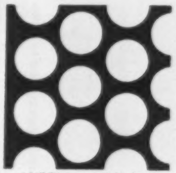

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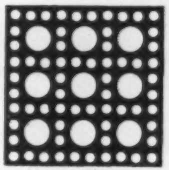

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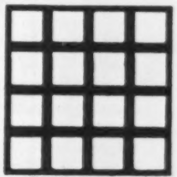

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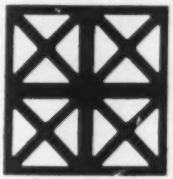

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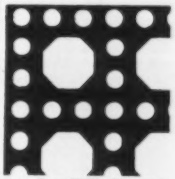

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Iron and Steel Scrap

Consumer prices, per gross ton, except as otherwise noted, including broker's commission, as reported to STEEL. *Changes shown in italics.*

STEELMAKING SCRAP COMPOSITE

Dec. 28	$51.83
Dec. 21	50.67
Nov. Aug.	46.08
Dec. 1954	32.58
Dec. 1950	45.50

Based on No. 1 heavy melting grade at Pittsburgh, Chicago and eastern Pennsylvania.

PITTSBURGH

No. 1 heavy melting	*50.00-52.00*
No. 2 heavy melting	*46.00-47.00*
No. 1 bundles	*50.00-52.00*
No. 2 bundles	*42.00-43.00*
No. 1 busheling	*50.00-52.00*
Machine shop turnings	32.00-33.00
Mixed borings, turnings	32.00-33.00
Short shovel turnings	*36.00-37.00*
Cast iron borings	*36.00-37.00*
Cut structurals, 3 ft lengths	*57.00-58.00*
Heavy turnings	*44.00-45.00*
Punchings & plate scrap	*57.00-58.00*
Electric furnace bundles	*53.00-54.00*

Cast Iron Grades

No. 1 cupola	*46.00-47.00*
Charging box cast	*44.00-45.00*
Heavy breakable cast	*44.00-45.00*
Unstripped motor blocks	*32.00-33.00*
No. 1 machinery cast	*54.00-55.00*

Railroad Scrap

No. 1 R.R.- heavy melt.	*55.00-56.00*
Rails, 2 ft and under	*67.00-68.00*
Rails, 18 in. and under	*68.00-69.00*
Rails, random lengths	*63.00-64.00*
Railroad specialties	*59.00-60.00*

Stainless Steel Scrap

18-8 bundles & solids	335.00-350.00
18-8 turnings	220.00-230.00
430 bundles & solids	100.00-110.00
430 turnings	60.00-65.00

CLEVELAND

No. 1 heavy melting	51.00-52.00
No. 2 heavy melting	40.00-41.00
No. 1 bundles	51.00-52.00
No. 2 bundles	36.00-37.00
No. 1 busheling	51.00-52.00
Machine shop turnings	26.00-27.00
Mixed borings, turnings	30.00-31.00
Short shovel turnings	30.00-31.00
Cast iron borings	30.00-31.00
Low phos.	50.00-51.00
Cut structural plates 2 ft and under	55.00-56.00
Alloy free, short shovel turnings	35.00-36.00
Electric furnace bundles	50.00-51.00

Cast Iron Grades

No. 1 cupola	50.00-51.00
Charging box cast	42.00-43.00
Stove plate	50.00-51.00
Heavy breakable cast	41.00-42.00
Unstripped motor blocks	33.00-34.00
Brake shoes	39.00-40.00
Clean auto cast	52.00-53.00
Burnt cast	39.00-40.00
Drop broken machinery	54.00-55.00

Railroad Scrap

No. 1 R.R. heavy melt.	53.00-54.00
R.R. malleable	59.00-60.00
Rails, 2 ft and under	71.00-72.00
Rails, 18 in. and under	72.00-73.00
Rails, random lengths	65.00-66.00
Cast steel	57.00-58.00
Railroad specialties	60.00-61.00
Uncut tires	57.00-58.00
Angles, splice bars	65.00-66.00
Rails, rerolling	71.00-72.00

Stainless Steel

(Brokers' buying prices; f.o.b. shipping point)

18-8 bundles, solids	335.00-345.00
18-8 turnings	195.00-205.00
430 clips, bundles, solids	100.00-110.00
430 turnings	50.00-60.00

YOUNGSTOWN

No. 1 heavy melting	52.00-53.00
No. 2 heavy melting	40.00-41.00
No. 1 bundles	52.00-53.00
No. 2 bundles	36.00-37.00
No. 1 busheling	52.00-53.00
Machine shop turnings	29.00-30.00
Short shovel turnings	34.00-35.00
Cast iron borings	29.00-30.00
Low phos.	54.00-55.00
Electric furnace bundles	47.50-48.50

Railroad Scrap

No. 1 R.R. heavy melt.	52.00-53.00

CHICAGO

No. 1 heavy melting	48.00-51.00
No. 2 heavy melting	41.00-42.00
No. 1 factory bundles	53.00-54.00
No. 1 dealer bundles	48.00-49.00
No. 2 bundles	37.00-38.00
No. 1 busheling	48.00-51.00
Machine shop turnings	31.00-32.00
Mixed borings, turnings	33.00-34.00
Short shovel turnings	33.00-34.00
Cast iron borings	33.00-34.00
Cut structurals, 3 ft	54.00-55.00
Punchings & plate scrap	55.00-56.00

Cast Iron Grades

No. 1 cupola	50.00-51.00
Stove plate	42.00-43.00
Unstripped motor blocks	39.00-40.00
Clean auto cast	55.00-56.00
Drop broken machinery	55.00-56.00

Railroad Scrap

No. 1 R.R. heavy melt.	53.00-54.00
R.R. malleable	61.00-62.00
Rails, 2 ft and under	67.00-68.00
Rails, 18 in. and under	68.00-69.00
Angles, splice bars	65.00-66.00
Rails, rerolling	70.00-72.00

Stainless Steel Scrap

18-8 bundles & solids	320.00-335.00
18-8 turnings	225.00-235.00
430 bundles & solids	100.00-105.00
430 turnings	45.00-50.00

DETROIT

(Brokers' buying prices; f.o.b. shipping point)

No. 1 heavy melting	46.00
No. 2 heavy melting	34.00
No. 1 bundles	46.00
No. 2 bundles	32.00
No. 1 busheling	46.00
Machine shop turnings	22.00
Mixed borings, turnings	22.00
Short shovel turnings	24.00
Punchings & plate scrap	53.00

Cast Iron Grades

No. 1 cupola	43.00
Charging box cast	36.00
Stove plate	34.00
Heavy breakable	35.00
Unstripped motor blocks	22.00
Clean auto cast	46.00
Malleable	40.00

BIRMINGHAM

No. 1 heavy melting	43.00-44.00
No. 2 heavy melting	38.00-39.00
No. 1 bundles	43.00-44.00
No. 2 bundles	30.00-31.00
No. 1 busheling	42.00-43.00
Cast iron borings	18.00-19.00
Short shovel turnings	30.00-31.00
Machine shop turnings	29.00-30.00
Electric furnace bundles	47.00-48.00

Cast Iron Grades (F.o.b. shipping point)

No. 1 cupola	47.50-48.00
Stove plate	44.50-45.50
Bar crops and plate	*53.00-54.00*
Structural plate, 2 ft	*52.00-53.00*
Unstripped motor blocks	*39.00-40.00*
Charging box cast	30.00-31.00
No. 1 wheels	38.00-39.00

Railroad Scrap

No. 1 R.R. heavy melt.	*50.00-51.00*
Rails, 18-in. and under	63.00-64.00
Rails, rerolling	64.00-65.00
Rails, random lengths	57.00-58.00
Angles, splice bars	60.00-61.00

PHILADELPHIA

No. 1 heavy melting	*55.00*
No. 2 heavy melting	*49.00*
No. 1 bundles	*55.00*
No. 2 bundles	*46.00*
No. 1 busheling	*55.00*
Electric furnace bundles	*56.00†*
Machine shop turnings	*36.00-37.00*
Mixed borings, turnings	*37.00*
Short shovel turnings	39.00
Heavy turnings	48.00
Structurals & plate	*55.00-57.00*
Couplers, springs, wheels	*56.00-57.00*
Rail crops, 2 ft & under	*66.00*

Cast Iron Grades

No. 1 cupola	*50.50-51.00*
Malleable	66.00
Heavy breakable cast	52.00-53.00
Drop broken machinery	*57.00-58.00*

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†Nominal

NEW YORK

(Brokers' buying prices)

No. 1 heavy melting	*48.00-50.00*
No. 2 heavy melting	*44.00-46.00*
No. 1 bundles	*48.00-50.00*
No. 2 bundles	*39.00-41.00*
Machine shop turnings	27.00-28.00
Mixed borings, turnings	28.00-29.00
Short shovel turnings	30.00-31.00
Low phos. (structural & plate)	48.00-49.00

Cast Iron Grades

No. 1 cupola	47.00-48.00
Unstripped motor blocks	28.00-30.00
Heavy breakable	45.00-46.00

Stainless Steel

18-8 sheets, clips solids	320.00-325.00
18-8 borings, turnings	150.00-160.00
430 sheets, clips, solids	120.00-125.00
410 sheets, clips, solids	100.00-105.00

BOSTON

(Brokers' buying prices; f.o.b. shipping point)

No. 1 heavy melting	43.00-44.00
No. 2 heavy melting	36.50-37.00
No. 1 bundles	43.00-44.00
No. 2 bundles	34.00-34.50
Machine shop turnings	23.00-24.00
Mixed borings, turnings	23.50-24.50
Short shovel turnings	26.00-27.00
No. 1 cast	37.00-37.50
Mixed cupola cast	35.00-35.50
No. 1 machinery cast	40.00-40.50

BUFFALO

No. 1 heavy melting	45.00-46.00
No. 2 heavy melting	39.00-40.00
No. 1 bundles	45.00-46.00
No. 2 bundles	36.00-37.00
No. 1 busheling	45.00-46.00
Mixed borings, turnings	30.00-31.00
Machine shop turnings	28.00-29.00
Short shovel turnings	31.00-32.00
Cast iron borings	31.00-32.00
Low phos.	48.00-49.00

Cast Iron Grades (F.o.b. shipping point)

No. 1 cupola	40.00-41.00
No. 1 machinery	43.00-44.00

Railroad Scrap

Rails, random lengths	55.00-56.00
Rails, 3 ft and under	57.00-58.00
Railroad specialties	47.00-48.00

CINCINNATI

(Brokers' buying prices; f.o.b. shipping point)

No. 1 heavy melting	45.00-46.00
No. 2 heavy melting	40.00-41.00
No. 1 bundles	45.00-46.00
No. 2 bundles	35.00-36.00
No. 1 busheling	45.00-46.00
Machine shop turnings	30.00-31.00
Mixed borings, turnings	28.00-29.00
Short shovel turnings	32.50-33.50
Cast iron borings	28.00-29.00
Low phos., 18 in.	55.00-56.00

Cast Iron Grades

No. 1 cupola	46.00-47.00
Heavy breakable cast	44.00-45.00
Charging box cast	44.00-45.00
Drop broken machinery	54.50-55.50

Railroad Scrap

No. 1 R.R. heavy melt.	52.00-53.00
Rails, 18 in. and under	67.00-68.00
Rails, random lengths	60.00-61.00

ST. LOUIS

(Brokers' buying prices)

No. 1 heavy melting	41.50
No. 2 heavy melting	39.00
No. 1 bundles	43.00
No. 2 bundles	35.00
Machine shop turnings	28.00
Short shovel turnings	28.00

Cast Iron Grades

No. 1 cupola	47.00
Charging box cast	40.00
Heavy breakable cast	*41.00*
Unstripped motor blocks	40.00
Brake shoes	*43.00*
Clean auto cast	47.00
Stove plate	40.00

Railroad Scrap

No. 1 R.R. heavy melt.	*55.50*
Rails, 18 in. and under	*67.00*
Rails, random lengths	*65.00*
Rails, rerolling	*70.00*
Angles, splice bars	*63.00*

SEATTLE

No. 1 heavy melting	44.00
No. 2 heavy melting	40.00
No. 1 bundles	40.00
No. 2 bundles	34.00
No. 3 bundles	25.00
Machine shop turnings	15.00-16.00
Mixed borings, turnings	15.00-16.00
Short shovel turnings	15.00-16.00
Electric furnace, No. 1	55.00

Cast Iron Grades (F.o.b. shipping point)

No. 1 cupola	50.00
Heavy breakable cast	38.00
No. 1 wheels	35.00
Unstripped motor blocks	33.00
Clean motor blocks	40.00
Stove plate (f.o.b. plant)	35.00
Brake shoes	35.00

Railroad Scrap

Rails, random lengths	33.00

LOS ANGELES

No. 1 heavy melting	39.00
No. 2 heavy melting	37.00
No. 1 bundles	39.00
No. 2 bundles	*33.00*
Machine shop turnings	*18.00*

Cast Iron Grades (F.o.b. shipping point)

No. 1 cupola	*46.00-48.00*

SAN FRANCISCO

No. 1 heavy melting	42.00
No. 2 heavy melting	38.00
No. 1 bundles	41.00
No. 2 bundles	37.00
No. 1 busheling	42.00
Machine shop turnings	20.00
Mixed borings, turnings	20.00
Cast iron borings	20.00
Short shovel turnings	23.00
Cut structurals	44.00
Heavy turnings	23.00
Punchings & plate scrap	42.00

Cast Iron Grades

No. 1 cupola	50.00
Charging box cast	35.00
Stove plate	39.00
Heavy breakable cast	36.00
Unstripped motor blocks	32.00
Brake shoes	35.00
Clean auto cast	50.00
No. 1 wheels	39.00
Burnt cast	23.00
Drop broken machinery	50.00

HAMILTON, ONT.

No. 1 heavy melting	43.50
No. 2 heavy melting	39.50
No. 1 bundles	43.50
No. 2 bundles	36.00
Mixed steel scrap	36.00
Mixed borings, turnings	17.00
Rails, remelting	52.50
Busheling, new factory: Prepared	41.50
Busheling, new factory: Unprepared	37.50
Short steel turnings	21.00

Cast Iron Grades†

No. 1 machinery cast	42.00-45.00

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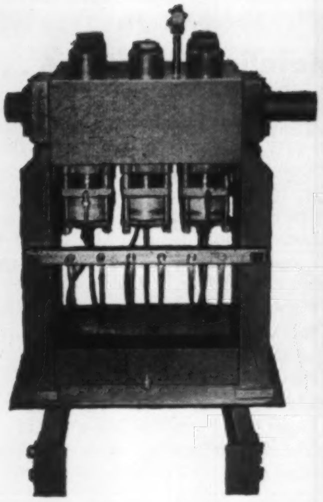
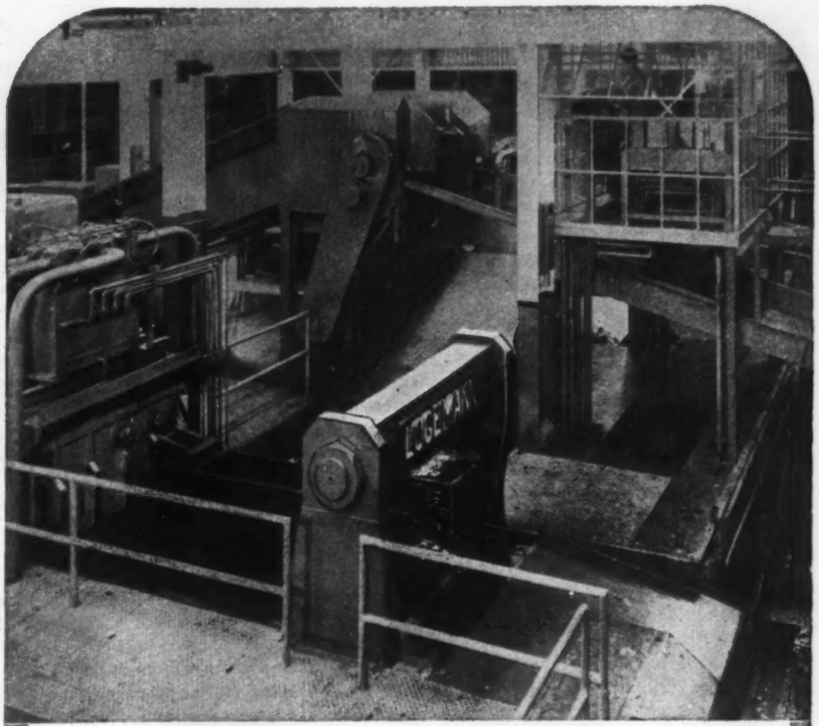
†F.o.b., shipping point.



LOGEMANN HYDRAULIC OPERATING VALVE

This compact valve was designed to control the movements of the hydraulic rams in large scrap presses but can be modified to suit similar operations on other hydraulic equipment. Interested parties will please outline the nature of the service, operating sequence, gallonage and pressure requirements.



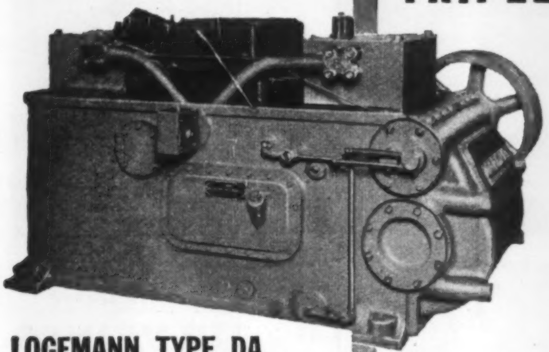
Get low cost, high density bales with LOGEMANN SELF-CONTAINED TRIPLE-COMPRESSION PRESSES

The illustration shows one of two large scrap-press units in a modern automotive plant. Over a period of many years, such units have baled sheet scrap skeletons and trim from metal operations in large industrial plants throughout the country, forming the scrap into high-density bales for re-melting in steel mills. Low baling costs are the result of correct design for heavy duty service, minimum maintenance and operating interruptions, as well as simplicity, accessibility and safety features.

Pioneers in the metal baling field, LOGEMANN engineers embodied in the design those features that have proven dependable over an extended period of years. Some installations in service over 35 years are still operating economically.

Tell Us the nature of your scrap!

LOGEMANN press sizes are not confined to the large models. Producers of sheet scrap—steel, copper, brass, or aluminum—are invited to submit their scrap baling problems regardless of tonnage. Please state the character of the metal, minimum tonnage to be handled in a given period of hours, range of gauges and, where possible, indicate maximum and minimum lengths and widths of pieces. Experienced sales engineers are available for discussion of your conditions and requirements.



LOGEMANN TYPE DA DOUBLE PRESSURE PUMPS

These compact and efficient opposed-cylinder reciprocating-plunger pumps for low and high pressure service lend themselves to a wide range of double pressure applications. They are close-coupled, reliable, and capable of delivering high gallonage, at low and high pressures, at low power costs.

LOGEMANN BROTHERS CO.

3126 W. BURLEIGH STREET • MILWAUKEE 10, WISCONSIN

(Concluded from page 487)

cific Northwest during 1955. Practically all went to Japan. In several instances, obsolete ships were loaded with scrap for the Far East. Upon reaching their destination, they were broken up for scrap. Six cargoes moved from this port and Portland, Oreg., in December.

Chartering of scrap cargoes is active. From the North Pacific to Japan freighters were chartered at $140,000 and $123,000, free loading and discharge. From the Gulf to Japan, four vessels were chartered, one at $209,000, the second at $212,000, and two others at $240,000.

There is no evidence of any weakness in the market. Bids opened a week ago at the Puget Sound Navy Yard brought offers of $47 for about 250 tons of No. 1 heavy melting, prepared; $44.13 for 1000 tons, unpreprepared; $51 for 400 tons of shearings.

Cleveland — Year-end dullness in the scrap market is expected to give way to a revival in demand for steelmaking and foundry grades of material as post-holiday operations are stepped up. Some brokers and dealers are of the opinion prices are about at a peak following the recent rapid rise.

Tin Plate . . .

Tin Plate Prices, Page 468

Prospects for heavy tin plate consumption are excellent as the new year gets under way. Expanding uses, such as those developed in the container industry last year, may well see 1956 volume topping that of 1955.

Pig Iron . . .

Pig Iron Prices, Page 471

The movement of pig iron into consumption is expected to increase now that the holidays are past. Some merchant iron sellers think January shipments will top those of December and will compare favorably with the tonnage movements in the better months during the fall.

The Mystic furnace at Everett, Mass., is down for repairs. It will likely be out of production three to four months for relining. The price of Mystic iron is unchanged for the first quarter. A substantial stockpile of iron has been accumulated at the stack. It is said to be well balanced as to analysis, and in sufficient volume to cover the bulk of consumers' needs during the suspension.

Inland Steel Co. put its record-setting blast furnace back into production Dec. 17 after a $2-million relining, which was done in a record 47 days.

Metallurgical Coke . . .

Metallurgical Coke Prices, Page 485

Midwestern producers of oven foundry coke have advanced their prices from $1.25 to $1.75 per ton. The increase is in line with that initiated in the East a week ago and reflects strong demand and the higher coal prices effected earlier this fall.

The increases in prices on oven foundry coke generally reflect stronger demand and a disposition of producers to bring profit on this grade up to a level with that for furnace coke. The foundry grade requires longer coking time than the furace grade.

Another factor for the price increase is the cost of coal which was advanced in the fall. With heavy demand for coal from abroad, especially low volatile, there is no sign of any easing in the price structure. In fact, higher prices are indicated.

In the Midwest, demand for foundry coke moved up somewhat in December but not to the same degree as pig iron. The first quatrer out-

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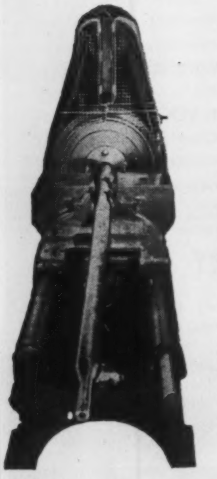

Designed for cold pointing of tubes and bars of steel and non-ferrous metals, the Stationary Die Swager is built in four sizes for tubes up to 6 inches in diameter. Rate of production is high . . . for example, a 2″ diameter mild steel tube by 6 SWG (or .192) can be swaged down to 1 3/16″ diameter in this machine at floor to floor production times 10 to 20 seconds each, (i.e. a production rate of 180 to 120 points per hour). This operation can be handled by one man. Write today regarding your specific job problems.

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look is for a continuance of strong demand.

Structural Shapes . . .

Structural Shape Prices, Page 466

The structural steel fabricating industry anticipates a year of high activity as 1956 opens. Demand for fabricated steel for construction is expected to be even greater than in 1955, with shipments exceeding those of last year.

Due to difficulty in obtaining structurals in adequate tonnages, shipments of fabricated structural steel last year dropped to about 2,700,000 tons, compared with 2,948,000 in 1954. Despite this decline, the 1955 total approximated the tonnage shipped in both 1951 and 1952.

Bookings of new orders last year were about 3,400,000 tons, highest since 1929 and 35 per cent above the 2,510,000 tons booked in 1954. Equally significant, the total backlog of orders on hand showed a steady rise each month throughout the year.

1956 Ore Prices Announced

John S. Wilbur, vice president-sales, the Cleveland-Cliffs Iron Co., Cleveland, announced his company has sold substantial tonnages of iron ore for delivery during the 1956 season at prices based on $10.95 per gross ton delivered at lower lake ports for Mesabi range nonbessemer ore.

Cleveland-Cliffs base prices effective for ore delivered during the year 1956, for the standard grades of iron ore containing 51.50 per cent iron natural delivered at rail of vessel lower lake ports, as announced by Mr. Wilbur are: Mesabi range nonbessemer, $10.95 per gross ton; Mesabi range bessemer, $11.10; Old range nonbessemer, $11.10; Old range bessemer, $11.25; open hearth lump, $12.10.

The foregoing prices are based on upper lake rail freight rates, lake vessel freight rates, handling and unloading charges, and taxes thereon, which were in effect Dec. 1, 1955, and increases or decreases after such date are for buyer's account.

Rails, Cars . . .

Track Material Prices, Page 469

Freight cars ordered in November totaled 51,066, the largest number for any month on record, reports the American Railway Car Institute and the Association of American Railroads. The previous peak in recent years was 30,065 cars in July, 1950.

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Reply Box 360, STEEL
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MARKEM
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The previous all-time high was 39,000 in January, 1924.

Deliveries of freight cars in November were 3427 units, compared with 3712 in October and 1302 in November, 1954.

On Dec. 1 the backlog of uncompleted cars was 109,370, highest since Apr. 1, 1952, when the total was 115,000.

Trade sources expect the Jan. 1 order backlog will be still higher because of the placing of heavy orders in December. Volume, in fact, is likely to surpass the November record. The New York Central and subsidiaries alone placed 17,750 cars in the month.

Canada . . .

Dominion Foundries & Steel Ltd. will spend $15 million on a new expansion program at Hamilton, Ont. This is in addition to a $12-million program now under way, and it will bring total expansion expenditures since 1950 to about $80 million.

The new program will include a second blast furnace; oxygen steelmaking capacity will be doubled; hot mill facilities will be enlarged. When completed, ingot capacity will be 720,000 tons. It now is 600,000 tons.

STRUCTURAL SHAPES . . .

STRUCTURAL STEEL PLACED

1620 tons, grade separation structures and bridge over New Haven Railroad, Connecticut turnpike, Greenwich, to Terry Contracting Co., New York, through Peter Mitchell Inc., Greenwich, general contractor.

1530 tons, Rudin apartment, 55th street and Lexington avenue, New York, to Harris Structural Steel Co., New York.

1145 tons, Kent Ave. power house, Board of Transportation, through Lehigh Structural Steel Co., Allentown, Pa.

REINFORCING BARS . . .

REINFORCING BARS PLACED

445 tons, grade structures and bridge over New Haven Railroad, Connecticut turnpike, Greenwich, Conn., to Capitol Steel Co., New York, through Peter Mitchell Inc., Greenwich, general contractor; also, 375 tons, steel piles to Bethlehem Steel Co., Bethlehem, Pa.

REINFORCING BARS PENDING

145 tons, state bridge work, Mercer county, Pa.; bids Jan. 6.

142 tons, state bridge work, Wyoming county, Pa.; bids Jan. 6.

Unstated, piers and abutments, railroad bridges, Noxon Rapids, Mont., power project, to Hansen & Parr, Spokane, Wash., $100,000 contract, by Washington Water Power Co., Spokane.

PIPE . . .

CAST IRON PIPE PLACED

400 tons, system expansion, Medford, Oreg., to Pacific States Cast Iron Pipe Co., Portland, Oreg.

RAILS, CARS . . .

LOCOMOTIVES PLACED

Central of Georgia, six 1750-hp diesel locomotives to Electro-Motive Division, General Motors Corp., La Grange, Ill.

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tough sprayed metal

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Modern metallizing—metal spraying—which for many years has saved millions of maintenance dollars by restoring worn machine parts for thousands of companies, is now helping many others improve their products, cut production costs.

In the production of new equipment, tough sprayed metal coatings provide highly desirable mechanical or electrical characteristics at low cost, in high speed, semi-automatic production.

General Electric, for example, a long-time user of metallizing to provide superior wearing qualities on critical areas of large turbine shafting, now applies sprayed metals to a wide range of its products. Many forward-looking companies have instituted investigative programs in their research and design labs to explore the use of metallizing as a means of giving their products competitive advantages in quality, or performance or price—or all three.

Metallizing may be able to help your company improve its products, economically, reduce machine maintenance costs, cut your bills for corrosion protection. It may pay you well to look into it. In any event you will find it a fascinating subject. Bulletin 51 illustrates and describes "Metallizing—its practical applications"—shows actual work being done in users' shops. We shall be happy to send you a copy.

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Especially made for marking metals in foundries, mills and factories. This ideal pair, HOTMARX and METAL MARK Markers, meet the most rigid requirements.

METAL MARK

Produces clear, legible and lasting marks on all metals up to 800°.

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Marks clearly and easily on metals so hot that ordinary markers would flame up and burn. Marks perfectly on metals up to 2000° and will not smoke or run.

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THE AMERICAN CRAYON COMPANY
SANDUSKY OHIO NEW YORK

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YOU GET WHAT YOU PAY FOR

Paul W. Christensen Jr.

VICE-PRESIDENT, THE CINCINNATI GEAR CO.

John Ruskin knew what he was talking about when he wrote: "There is hardly anything in the world that some man cannot make a little worse and sell a little cheaper, and the people who consider price only are his prey." Just as this applies to ice cream or magnetos or wool socks, so does it apply to gears.

This "cheap price" paid for a necessarily cheap product may not prove to be such a bargain if the ultimate cost of using such a product can be determined. In the case of gears, each of the following points directly affects *final* cost: 1. The "price tag" on the gear itself. 2. Extra assembly time wasted in fitting and salvaging "off color" gears. 3. Lack of reasonable service life. 4. Excessive noise. The first point is obvious, and the second becomes so upon observation: for not until the gears have been assembled, "run off," and passed by inspection can the direct cost of the gears be determined. Often part or all of the potential savings on "price" are lost (often without even being recognized) on the assembly floor. Points three and four represent more insidious and hard-to-measure costs—but costs that can be even more damaging, for they will be measured by your *customer*, and can easily spell the difference between repeat orders or a customer lost for good.

Thus the *ultimate cost* of a gear that appears to be a bargain may, in the final analysis, actually be exhorbitant. That's why it can *pay* you to buy *good* gears, custom made for your specific application—gears made by The Cincinnati Gear Company.

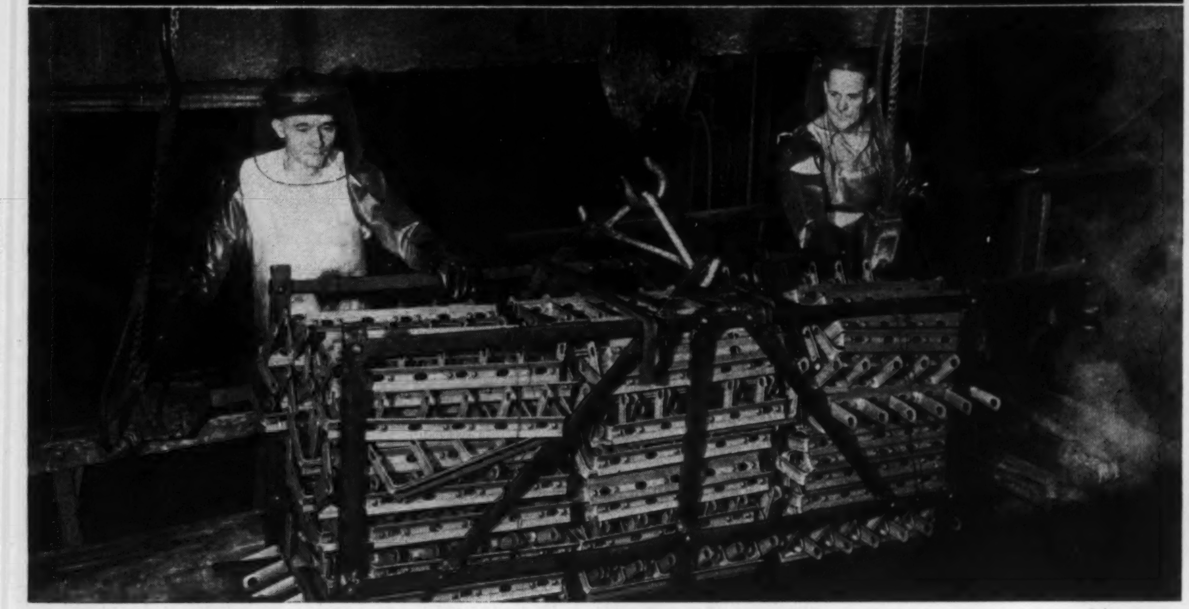
THE CINCINNATI GEAR CO.

CINCINNATI 27, OHIO

"Gears— Good Gears Only"

CINTI
ATI GEAR CO.

How's this for corrosion control?



Carpenter Stainless No. 20 pickling rack still in H_2SO_4 service after 5½ years!

Steady exposure to 5-15% sulphuric acid at temperatures up to 200°F for over 5½ years is the service record of this pickling rack made from Carpenter Stainless No. 20. It supports heavy loads of pole line hardware during pickling. Dependable corrosion resistance in the steel is invaluable.

Ordinary steels lasted but a short time on this application. Then, Carpenter Stainless No. 20 was put to work. The result is added safety for the workers, substantial savings in replacements, and uninterrupted production.

Today industry is finding a host of uses for this super corrosion-resisting steel. A wide variety of products of No. 20 can be purchased already fabricated . . . or you can build your own. In addition to hot sulphuric acid, this unique steel resists attack by a long list of other corrosives.

Whatever your corrosive application, talk to Carpenter *first* about the cost-saving advantages of No. 20. Over 70 years' experience in the development and manufacture of specialty steels are at your service when you contact your nearest Carpenter Mill-Branch Warehouse, Office or Distributor. *The Carpenter Steel Co., 139 W. Bern St., Reading, Pa.*

Partial list of Stainless No. 20 products now being fabricated:

- Agitating equipment
- Baskets
- Centrifugal pumps and parts
- Coils
    - Heating and cooling
- Dehydrators
- Exchangers, Heat
- Fans
- Fastenings (all types of standard and special design)
- Fittings
- Grommets
- Hangers
- Instruments
    - Heat and temperature
    - Industrial liquid level
- Mixers
- Nozzles
- Pails for sulphuric acid
- Pipe
- Processing equipment (food and chemical industry)
- Pump parts
- Screws
- Tanks, welded
- Thermocouple wells
- Tube
- Valve parts
- Valves
- Vessels, welded
- Weld rods
- Wire
    - Baskets
    - Cloth
    - Stranded
- And others

Carpenter Stainless No. 20-Cb is available from The Carpenter Steel Company, Alloy Tube Division, Union, New Jersey, in the forms of tubing, sheet, strip, pipe and plate; and Stainless No. 20 in the forms of bars, billets and wire.

Our new leaflet "*Positive Protection*" has a more complete list of available products made from No. 20. If you haven't a copy, please drop us a line.

Carpenter STEEL

Super Corrosion-Resistant Stainless

Pioneering in Improved Tool, Alloy and Stainless Steels Through Continuing Research
Export Department: The Carpenter Steel Co., Port Washington, N. Y.—"CARSTEELCO"

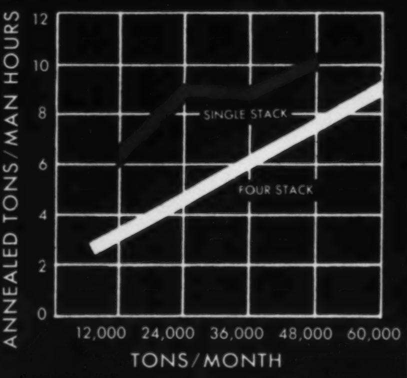
QUESTION:

What KIND of annealing furnaces create the best working conditions for most annealed tons per man hour?

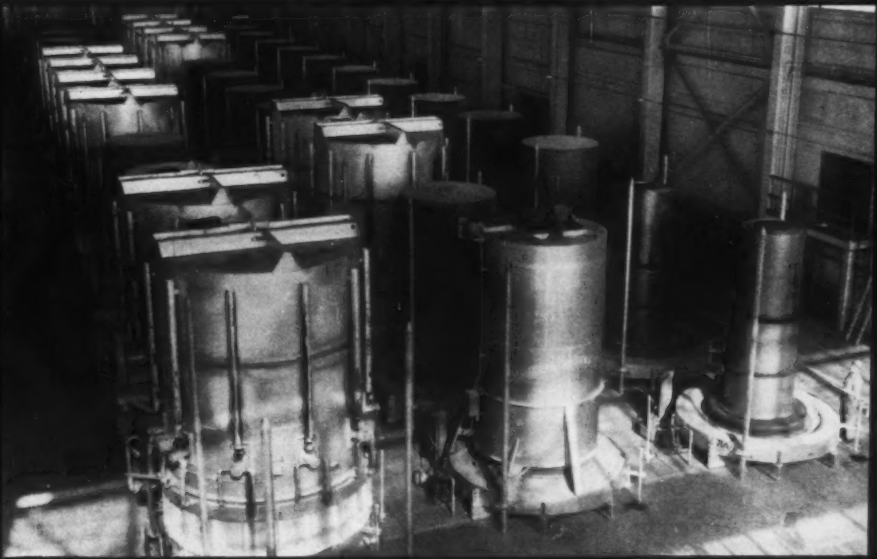
ANSWER:

THE LEE WILSON SINGLE STACK PORTABLE BASE FURNACES!

PROVED LOWEST LABOR COST PER TON



Based on studies of the most efficiently operated plants for both single stack and four stack furnaces.



NO OTHER KIND OF INSTALLATION IS SO CLEAN, COMFORTABLE AND EFFICIENT AS THIS ALL SINGLE STACK ANNEALING DEPARTMENT!

Lee Wilson

ENGINEERING COMPANY, Inc.
CLEVELAND, OHIO

How Dodge Manufacturing Corporation designs pillow blocks that pack more capacity in less space

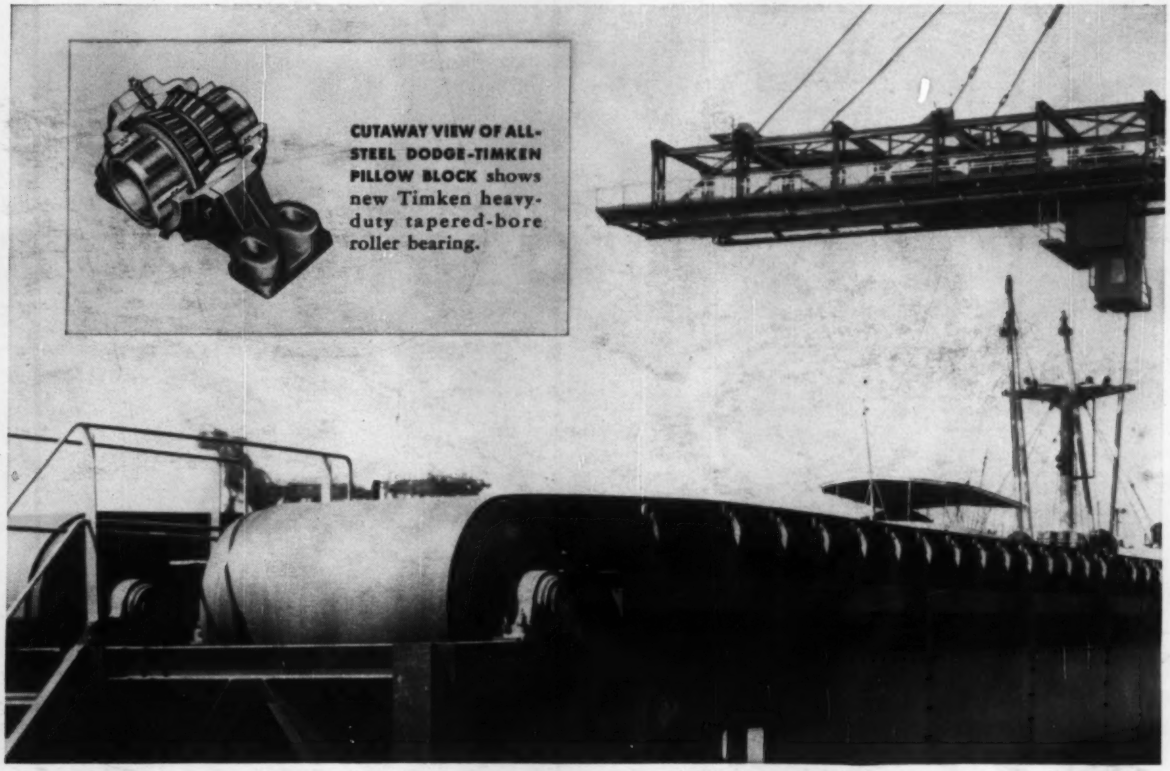
THESE design features make Dodge-Timken pillow blocks ideal for use where big load capacity in small space is needed: (1) All-steel construction gives extra strength. (2) No space-consuming special thrust devices are needed, because the Timken® tapered roller bearings used take *both* radial and thrust loads in any combination. (3) Timken bearings have high load capacity because of their *full line contact* between rollers and races.

The Dodge-Timken pillow blocks shown below support all head, tail and take-up pulleys on this conveyor belt which transports ore from ships to railroad cars. Timken bearings take the shock loads because all rollers and races are made of case-carburized steel, with tough, impact-resistant cores under hard, wear-resistant surfaces.

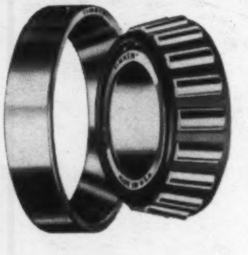
The Dodge-Timken All-Steel pillow blocks on this conveyor utilize a special new type of Timken heavy-duty, self-aligning tapered-bore roller bearing. The pillow block is one of many expansion and non-expansion types made by Dodge Manufacturing Corporation for general power transmission and machine applications; such as Type E, Double-Interlock, Type C and Special-Duty blocks. All are factory-sealed against abrasive dust and dirt.

Be sure you get all the advantages of Timken bearings when you buy or build pillow blocks, or any equipment. The Timken Company is America's only bearing manufacturer who makes its own steel. The Timken Roller Bearing Company, Canton 6, Ohio. Canadian plant: St. Thomas, Ontario. Cable address: "TIMROSCO".

This symbol on a product means its bearings are the best.



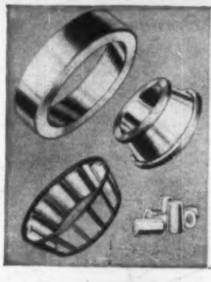
CUTAWAY VIEW OF ALL-STEEL DODGE-TIMKEN PILLOW BLOCK shows new Timken heavy-duty tapered-bore roller bearing.



TIMKEN

TRADE-MARK REG. U. S. PAT. OFF.

TAPERED ROLLER BEARINGS



DESIGN LEADERSHIP

The first Timken tapered roller bearing was produced in 1898. Since then the one-piece multiple perforated cage, wide area contact between roller ends and ribs, and every other important tapered roller bearing improvement have been introduced by The Timken Roller Bearing Company.

Only Timken tapered roller bearings have these advantages: 1. advanced design; 2. precision manufacture; 3. rigid quality control; 4. Timken fine alloy steels.

NOT JUST A BALL ○ NOT JUST A ROLLER ▭ THE TIMKEN TAPERED ROLLER ▭ BEARING TAKES RADIAL ▯ AND THRUST —▯— LOADS OR ANY COMBINATION —▯—